

**DISTRIBUTIONAL SURVEYS OF
FRESHWATER BIVALVES IN TEXAS:
PROGRESS REPORT FOR 2003**

by
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ABSTRACT

During 2003, over 1,260 unionid specimens were documented among 231 locations that were examined statewide in Texas where specimens were either directly surveyed by Heart of the Hills Fisheries Science Center (HOH) staff or were sent to HOH by volunteers or other Texas Parks and Wildlife Department personnel. Living and very recently and recently dead specimens were documented at 28.1% of the locations examined and 51.9% 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 2003. Drought conditions that began in mid-1995 lessened somewhat in 2003. Indeed, high waters at some locations precluded obtaining good estimates of species present. However, early losses associated with dewatering likely accounted for the reported failure to find unionids at locations previously known to support populations. Additional sampling on the Rio Grande by HOH and Laredo Community College personnel provided information on additional rare and endemic species in that system, including perhaps the first record of living Salina mucklets *Potamilus metnecktayi*. Additionally, volunteers were able to examine a number of minor water bodies in southeastern Texas and a number of drainage basins.

CONTENTS

INTRODUCTION.....	1
MATERIALS AND METHODS.....	1
RESULTS AND DISCUSSION.....	2
Canadian River Drainage.....	2
Red River Drainage.....	2
Sabine River Drainage.....	2
Neches River Drainage.....	3
Trinity River Drainage.....	4
Brazos River Drainage.....	5
Colorado River Drainage.....	7
Matagorda Bay Drainage.....	11
Lavaca – Navidad River Drainage.....	12
Guadalupe River Drainage.....	13
Nueces – Frio River Drainage.....	19
Baffin Bay – Laguna Madre Drainage.....	21
Rio Grande Drainage.....	21
Water Body and Species Summary.....	43
LITERATURE CITED.....	43
FIGURE.....	46
APPENDIX I.....	47

INTRODUCTION

Beginning in January 1992, Texas Parks and Wildlife Department's (TPWD) Heart of the Hills Fisheries Science Center (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, 2001a, 2001b, 2002, 2003). 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 2003, 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. Despite providing terminology definitions to most volunteers, some still create their own status terms that are reported here as they were submitted (e.g., “weathered”, “old”).

RESULTS AND DISCUSSION

Canadian River Drainage

Lake Meredith, at Big Blue Creek mud flats, Moore County, Texas, 12 December 2003.

The Nature Conservancy staff collected a single giant floater valve (relatively recently dead) and sent it to HOH for identification.

Red River Drainage

Lake Kemp near Seymour (Wichita River drainage), Baylor County, Texas, 7-8 August 2003.

Pearl harvesters reported being unable to access this reservoir due to private property surrounding the site. To date, TPWD has no mussel data on this water body.

Lake Kickapoo (Little Wichita River drainage), Archer County, Texas, 7-8 August 2003.

Pearl harvesters examined this reservoir, but reported finding no unionids.

Lamar Lake (Pine Creek drainage), Camp Maxey, Lamar County, Texas, 29 April 2003.

During a survey of this site for the US Department of Defense, personnel from Stephan F. Austin State University documented three living giant floaters and three living paper pondshells. Photographs were sent to HOH for identification.

Lee Moor Lake (Pine Creek drainage), Camp Maxey, Lamar County, Texas, 29 April 2003.

During a survey of this site for the US Department of Defense, personnel from Stephan F. Austin State University documented the presence of living giant floaters and paper pondshells ($N = 20$). Photographs and specimens were sent to HOH for identification.

Crook Lake (Pine Creek drainage) near Paris, Lamar County, Texas, 16 April 2003.

A volunteer reported finding two, relatively recently dead yellow sandshells at this site.

Sabine River Drainage

Roadside marsh (Big Cypress Creek drainage), 4.8 km east of Buna, Jasper County, Texas, 30°25.907'N, 93°54.354'W, 19 October 2003.

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

Roadside drainage ditch (Big Cypress Creek drainage), 1.6 west of Newton County line, Jasper County, Texas, 30°26.154'N, 93°53.648'W, 19 October 2003.
A volunteer examined this site, but no bivalves were found.

Marsh off SH 62 north of the Orange County line and 21 km south of Buna, Newton County, Texas, 30°15.723'N, 93°54.104'W, 19 October 2003.
A volunteer examined this site, but no bivalves were found.

Roadside drainage ditch, At SH 62 north of Mauriceville, Orange County, Texas, 30°13.358'N, 93°52.924'W, 19 October 2003.
A volunteer examined this site, but no bivalves were found.

Roadside drainage ditch, At SH 62 south of Mauriceville, Orange County, Texas, 30°11.692'N, 93°51.968'W, 19 October 2003.
A volunteer examined this site, but no bivalves were found.

Lion's Orange City Park, Orange, Orange County, Texas, 30°05.543'N, 93°44.949'W, 19 October 2003.
A volunteer examined this site and found dead Asian clam shells.

Marsh off US 90 behind Walmart store, Orange, Orange County, Texas, 30°05.402'N, 93°46.005'W, 19 October 2003.
A volunteer examined this site, but no bivalves were found.

Marsh on SH 73 just north of the Intercoastal Waterway, Orange, Orange County, Texas, 30°00.119'N, 93°51.949'W, 19 October 2003.
A volunteer examined this site and no bivalves were found, but the substrate was oyster shell material.

Roadside pond, just west of Sea Rim State Park, 29°40.472'N, 94°03.075'W, Jefferson County, Texas, 29°40.472'N, 94°03.075'W, 19 October 2003.
A volunteer examined this site and no bivalves were found, but the substrate was oyster shell material.

Neches River Drainage

Angelina River at US 59 (Nacogdoches-Lufkin Crossing), Nacogdoches and Angelina counties, Texas, 13 May 2003.
Personnel from Stephan F. Austin State University examined this site and sent photographs of one threeridge and one western pimpleback (both recently dead) and two living pistolgrip specimens to HOH for identification.

Village Creek, at US 96, Hardin County, Texas, 30°17.106'N, 94°11.474'W, 2 October 2003.
 TPWD personnel accompanying a university field trip documented the following specimens:

Village Creek at US 96				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Threeridge	0	0.5x2	relatively recently dead	
Louisiana fatmucket	1	0.0	-	
Threehorn wartyback	1	0.0	-	
Western pimpleback	1	0.0	-	

Village Creek, location unstated, Hardin County, Texas, 28 June 2003.

A volunteer collected a single juvenile sandbank pocketbook (63 mm sl) that was ultimately sent to HOH for identification. This is the first evidence of reproduction in this species in Texas since TPWD began mussel studies in 1992.

Trinity River Drainage

Lost Creek Reservoir near Jacksboro, Jack County, Texas, 13 December 2003.

TPWD personnel documented Asian clams at this location.

Swale adjacent to McCommas Landfill levee south of the Trinity River, Dallas County, Texas, 11 April 2003.

A volunteer reported finding two dead (exact condition unstated) giant floaters at this site.

Bear Creek west of Meyers Road (West Branch Trinity River drainage), Dallas, Dallas County, Texas, 15 February 2003.

A volunteer examining this site found shells of pondhorns (*Uniomereus* sp.?) and Asian clams (reported as "not fresh").

North Mesquite Creek (West Branch Trinity River drainage), Dallas, Dallas County, Texas, 15 February 2003.

A volunteer reported observing dead shells of small pondhorns (*Uniomereus* sp.?) at this site.

South Mesquite Creek (West Branch Trinity River drainage), Dallas, Dallas County, Texas, 15 February 2003.

A volunteer reported observing dead shells of small pondhorns (*Uniomereus* sp.?) at this site.

Small pond, north of the North Dallas Tollway and Frankford road between Park Grove and Quail Hollow, Dallas, Dallas County, Texas, 10 November 2003.

A volunteer reported finding 44.0 + 0.5x21 dead paper pondshells at this site.

Oak Lake (Trinity River drainage), Arlington, Tarrant County, Texas, 3 May 2003.

A homeowner on a private lake in Arlington sent five very recently dead giant floater shells to HOH for examination following a mussel kill at the site.

Lost River tributary of the Trinity River near US 10 east of Houston, Chambers County, Texas, 29°51'53.0" N, 94°45'30.0" W, 28 April 2003.

TPWD personnel collected a single living Tampico pearlymussel here along with a shell of *Atlantic rangia*. This is a new range extension for the species in southeastern Texas and the Trinity River drainage and was reported by Howells and Tirpak (2003).

Brazos River Drainage

White River Reservoir near Post (Mountain Fork Brazos River drainage), Crosby County, Texas, 7-8 August 2003.

Pearl harvesters examined this reservoir, but reported no unionids were found.

Hubbard Creek Reservoir (Hubbard Creek drainage), Stephens County, Texas, 7-8 August 2003.

Pearl harvesters examined this reservoir and reported finding living specimens of Tampico pearlymussel, bleufer, giant floater, and southern mapleleaf. They reported water levels to be down about 5 m.

Millers Creek Reservoir (Mountain Fork Brazos River drainage), Baylor County, Texas, 7-8 August 2003.

Pearl harvesters examined this reservoir, but reported no unionids were found.

Cisco Reservoir (Hubbard Creek drainage), Eastland County, Texas, 7-8 August 2003.

Pearl harvesters examined this reservoir and reported the water was clear, but only giant floaters and Asian clams were found.

Lake Graham (Salt Creek Drainage), Young County, Texas, 7-8 August 2003.

Pearl harvesters examined this reservoir and reported finding Tampico pearlymussel and giant floater as well as an unidentified pimpleback species. They reported water levels were down about 1.5-m in this power-plant reservoir. The pimpleback found here would be expected to be smooth pimpleback (the only pimpleback in the drainage). If so, this could represent one of the few surviving populations of this seriously threatened endemic mussel.

East Yegua Creek, at Lee-Burleson County line at CR 132, 30°19.188' N, 96°44.449' W, Burleson County, Texas, 28 September 2003.

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

Unnamed creek, at FM 60 0.3 km west of CR 410, Burleson County, Texas, 30°21.781'N, 96°37.922'W, 28 September 2003.

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

Lake Somerville, Welch Park, Burleson County, Texas, 30°20.443'N, 96°30.485'W, 28 September 2003.

A volunteer examined this site, but found only dead Asian clam shells.

Roadside drainage ditch, at SH 36, 3.2 km south of Lyons, Burleson County, Texas, 30°24.391'N, 97°02.925'W, 28 September 2003.

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

Yegua Creek, below Lake Somerville dam, Burleson County, Texas, 30°19.343'N, 96°30.485'W, 28 September 2003.

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

Concrete drainage ditch at Avenue B and 13th Street, Somerville, Burleson County, Texas, 30°21.011'N, 96°31.935'W, 28 September 2003.

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

Creek at FM 1624 downstream of Cedar Bluff Lake (Yegua Creek drainage), Lee County, Texas, 30°22.710'N, 97°04.377'W, 28 September 2003.

A volunteer examined this site and reported the following specimens:

Creek at FM 1624				
Species	N alive	N shells	Condition	Percentage
Yellow sandshell	0	1.0	long dead	33.3
Southern mapleleaf	0	1.0	long dead	33.3
Texas lilliput	0	1.0	long dead	33.3
No Asian clams were found				

Roadside drainage ditch, at CR 323, Lee County, Texas, 30°22.143'N, 97°02.925'W, 28 September 2003.

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

Bessies Bayou, south of US 10 at SH 1489, Waller County, Texas, 10 September 2003.

A volunteer sent a single recently dead giant floater shell collected at this site to HOH for identification.

Colorado River Drainage

Yoakum County Park Pond (Colorado River drainage), Denver City, Yoakum County, Texas, 14 September 2003.

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

J.B. Thomas Reservoir near Snyder, Scurry County, Texas, 7-8 August 2003.

Pearl harvesters examining this reservoir reported to HOH not finding any unionids or their shells at this location.

Colorado River at Ballinger, Runnels County, Texas, 7-8 August 2003.

Pearl harvesters examining this area reported to HOH not finding any unionids present. Anecdotally, they indicated they believed the site to have been heavily worked by musselers recently.

Elm Creek at Ballinger, Runnels County, Texas, 7-8 August 2003.

Pearl harvesters examining this area reported to HOH not finding any unionids present. Anecdotally, they indicated they believed the site to have been heavily worked by musselers recently. This was especially troubling because much of this site is a TPWD mussel sanctuary.

South Pool Twin Buttes Reservoir (Concho River Drainage), Tom Green County, Texas, 7-8 August 2003.

Pearl harvesters reported to HOH water was being pumped from this reservoir and levels were falling rapidly. They reported finding juvenile bleufers abundant.

Concho River, south bank at FM 1692 south of Miles, Tom Green County, Texas, 7 July 2003.

A volunteer reported finding two long dead valves of bleufer and two Asian clam shells at this site.

Brady Lake (Brady Creek drainage), Brady, McCulloch County, Texas, 7-8 August 2003.

Pearl harvesters examined this reservoir and reported finding Tampico pearlymussel, bleufer, and southern mapleleaf. They reported small, juvenile Tampico pearlymussel were particularly abundant.

Nasse Creek, at Old Kerrville Road off SH 16 south of Fredericksburg, Gillespie County, Texas, 30°13.359'N, 98°55.430'W, 6 December 2003.

A volunteer examined this site and found:

Nasse Creek at Old Kerrville Road				
Species	N alive	N shells	Condition	Percentage
Pondhorn	0	0.5x1	subfossil	50.0
Paper pondshell	0	0.5x1	long dead	50.0

Asian clam (present, both white and purple forms)

Live Oak Creek Lake below the golf course crossing on the upper end of the lake (Pedernales River drainage), Lady Bird Johnson Park, Fredericksburg, Gillespie County, Texas, 19 June 2003.

TPWD and several volunteers examined this site, but found only Asian clam present.

Live Oak Creek Lake above the lower-most dam (Pedernales River drainage), Lady Bird Johnson Park, Fredericksburg, Gillespie County, Texas, 19 June 2003.

TPWD and several volunteers examined this site but the substrate was soft silt with a covering of algae and *Chara*. No bivalves were found.

Live Oak Creek below the lower-most dam (Pedernales River drainage), Lady Bird Johnson Park, Fredericksburg, Gillespie County, Texas, 30°14.310'N, 98°54.666'W, several dates.

TPWD and volunteers examined this site and documented the following specimens:

12 June 2003

Live Oak Creek below the lower-most dam, Lady Bird Johnson Park

Species	N alive	N shells	Condition	Percentage
Texas fatmucket	0	0.5x1	subfossil	50.0
Texas lilliput	0	0.5x1	recently dead	50.0
Paper pondshell	0	fragments	relatively recently dead	-
Asian clam (present)				

19 June 2003.

Live Oak Creek below the lower-most dam, Lady Bird Johnson Park

Species	N alive	N shells	Condition	Percentage
Texas fatmucket	1	1.0+0.5x4	relatively recently dead to subfossil	66.7
Texas lilliput	0	1.0	very recently dead	11.1
Paper pondshell	1	0.5x1+ fragments	relatively recently dead	22.2
Asian clam – present				

18 September 2003

Live Oak Creek below the lower-most dam, Lady Bird Johnson Park				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas lilliput	0	0.5x2	long dead	100.0

4 December 2003

Live Oak Creek below the lower-most dam, Lady Bird Johnson Park				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Paper pondshell	0	1.0	relatively long dead	33.3
Texas lilliput	0	1.0+0.5x1	relatively long dead	66.7

6 December 2003

Live Oak Creek below the lower-most dam, Lady Bird Johnson Park				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Paper pondshell	0	0.5x1	long dead	100.0
Asian clam (present)				
Sphaeriidae (present)				

7 December 2003

Live Oak Creek below the lower-most dam, Lady Bird Johnson Park				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Asian clam (present)				
Sphaeriidae (present) – fingernail clam (<i>Sphaerium transversum</i>)				

The collection of a living Texas fatmucket at a new location was reported in Howells et al. (2003).

Pedernales River, LBJ National Historical Park, Gillespie County, Texas, 25 January 2003.

Park personnel collected a relatively long dead valve fragment of Texas lilliput. It was ultimately sent to HOH for identification, then returned to the park.

Barton Springs (Colorado River tributary), Travis County, Texas, 24 November 2003.
 Personnel from The Nature Conservancy collected several relatively long dead Asian clam shells and valves here and sent them to HOH for identification.

Colorado River, at Hornsby Wastewater Treatment Plant, Austin, Travis County, 23 November 2003.
 A volunteer examined this site and found a long-dead, unidentifiable piece of unionid shell and abundant Asian clams.

Irrigation ditch (not specific location given), Wharton County, Texas, 4 April 2003.
 Texas Commission for Environmental Quality personnel working in this area recovered several dead tapered pondhorn specimens and sent photographs to HOH for identification.

Caney Creek at SH 35 3.2 km east of Van Vleck (Colorado River drainage), Matagorda County, Texas, 8 January 2003.
 A volunteer examined this location and reported the following specimens:

Caney Creek at SH 35, 3.2 km east of Van Vleck				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Round pearlshell	0	1.0	relatively recently dead	33.3
Yellow sandshell	0	1.0	long dead	33.3
Giant floater	0	0.5x1	relatively recently dead	33.3
Asian clam (present)				

Hardeman Slough at SH 35 (Colorado River drainage), just east of Van Vleck, Matagorda County, Texas, 8 January 2003.
 A volunteer examined this location and reported the following specimens:

Hardeman at SH 35, east of Van Vleck				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Yellow sandshell	0	1.0	recently dead	25.0
Giant floater	0	3.0	recently dead	75.0
Asian clam (abundant)				

Canal west of Bay City at SH 35, north side opposite Lower Colorado River Authority (Colorado River drainage), Matagorda County, Texas, 8 January 2003.
 A volunteer examined this location, but no unionids or Asian clams were found.

Colorado River at SH 35, west of Bay City, Matagorda County, Texas, 8 January 2003.

A volunteer examined this location, but only a single, small Asian clam shell was found.

Colorado River at SH 35, west of Bay City, Matagorda County, Texas, 5 February 2003.

A volunteer examined this location, but found only a single, very recently dead yellow sandshell. No Asian clams or their shells were found.

Irrigation canal at SH 35 (Colorado River drainage), just east of Markham, Matagorda County, Texas, 8 January 2003.

A volunteer examined this location and reported the following specimens:

Irrigation canal east of Markham

Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearl mussel	0	1.0	very recently dead	20.0
Yellow sandshell	0	1.0	recently dead	20.0
Giant floater	0	3.0	recently dead	60.0
Asian clam (few)				

Matagorda Bay Drainage

Canal 3.7 km west of Markham on FM 2431, Matagorda County, Texas, 5 February 2003.

A volunteer examined this site and reported finding:

Canal 3.7 km west of Markham

Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Yellow sandshell	0	1.0+0.5x1	long dead	100.0

Bucks Bayou at SH 35 east of Bay City, Matagorda County, Texas, 8 January 2003.

A volunteer examined this area and reported the following specimens:

Bucks Bayou east of Bay City

Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Yellow sandshell?	0	3.0+0.5x2	relatively recently dead	100.0

Tres Palacios River at FM 2431, west of Markham, Matagorda County, Texas, 8 January 2003.
 A volunteer examined this area and reported the following specimens:

Tres Palacios River at FM 2431				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Round pearlshell	0	0.5x2	relatively recently dead	40.0
Yellow sandshell	0	1.0	recently dead	20.0
Lilliput	0	1.0+0.5x1	recently dead	40.0
Asian clam (present)				

Juanita Creek at FM 2431, just west of the Tres Palacios River, Matagorda County, Texas,
 8 January 2003.

A volunteer examined this area and reported the following specimens:

Juanita Creek at FM 2431				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Round pearlshell	0	0.5x1	relatively recently dead	50.0
Yellow sandshell	0	1.0	recently dead	50.0
Asian clam (present)				

West Carancahua Creek at SH 111, east of Lake Texana, Jackson County, Texas, 5 February
 2003.

A volunteer examined this area and reported the following specimens:

West Carancahua Creek at SH 111				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Southern mapleleaf	3	4.0	recently dead	87.5
Lilliput	0	1.0	relatively recently dead	12.5

Lavaca – Navidad River Drainage

Navidad River at FM 401, east of SH 111 and north of Edna, Jackson County, Texas, 5 February
 2003.

A volunteer examined this area, but found no unionids. Only a few “old” valves of Asian clam were present.

Navidad River, county park north side of FM 401, Jackson County, Texas, 5 February 2003.

A volunteer examined this area and reported the following specimens:

Navidad River, park at FM 401				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Yellow sandshell	0	0.5x1	recently dead	100.0
Asian clam (shells abundant)				

Navidad River at FM 283, east of Morales, Jackson County, Texas, 5 February 2003.

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

Grafe Branch Creek at FM 2616, north of Ezzell, Lavaca County, Texas, 5 February 2003.

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

Lavaca River at US 77 (90A) at Hallettsville, Lavaca County, Texas, 5 February 2003.

A volunteer examined this area and reported the following specimens:

Lavaca River at US 77, Hallettsville				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Yellow sandshell	0	3.0+0.5x2	recently dead	20.0
Giant floater	0	0.5x2	long dead	4.0
Southern mapleleaf	0	0.5x1	relatively recently dead	8.0
Texas lilliput	0	1.0+0.5x16	recently to very long dead	68.0
Asian clam (abundant)				

Guadalupe River Drainage

North Fork of the Guadalupe River, Wagon Wheel Crossing on FM 1340, Kerr County, Texas,
30°03.704'N, 99°26.769'W, 5 October 2003.

A volunteer examined this site and found dead Asian clam shells.

Unnamed creek crossing, at FM 1340 upstream of Benson Crossing, Kerr County, Texas,
30°04.008'N, 99°22.982'W, 7 October 2003.

A volunteer examined this site and found dead Asian clam shells.

North Fork of the Guadalupe River, Benson Crossing on FM 1340, Kerr County, Texas,
30°03.167'N, 99°27.129'W, 5 October 2003.

A volunteer examined this site and found dead Asian clam shells.

North Fork of the Guadalupe River, Hope Crossing on FM 1340, Kerr County, Texas,
30°04.008'N, 99°22.982'W, 5 October 2003.

A volunteer examined this site and found dead Asian clam shells.

North Fork of the Guadalupe River, Mo Ranch waterfront off FM 1340, Kerr County, Texas, 10
October 2003.

A volunteer examined this site and found dead Asian clam shells.

North Fork of the Guadalupe River, Cherry Springs Ranch crossing on Rock Bottom Road off
FM 1340, Kerr County, Texas, 30°03.150 N, 99°29.049'W, 21 November 2003.

A volunteer examined this site and found Asian clams and fingernail clams (*Pisidium*
sp.), but no unionids were noted.

North Fork of the Guadalupe River, access point at Kerr Wildlife Management Area, Kerr
County, Texas, 6 September 2003.

A volunteer examined this site, but found only dead Asian clam shells.

North Fork of the Guadalupe River, Schumacher Crossing at SH 39, Kerr County, Texas,
30°14.130'N, 98°19.372'W, 21 December 2003.

A volunteer examined this site, but found on dead Asian clam shells in shoreline drift.

South Fork of the Guadalupe River, 1st Smith Crossing, Kerr County, Texas, 29°22.710'N,
99°26.946'W, 4 October 2003.

A volunteer examined this site and found a single long dead paper pondshell. No Asian
clams were present.

South Fork of the Guadalupe River, Lynxhaven Crossing at SH 39, 29°58.807'N, 99°26.557'W,
Kerr County, Texas, 29 September 2003.

A volunteer examined this site and found dead Asian clam shells.

South Fork of the Guadalupe River, River Inn Crossing at SH 39, Kerr County, Texas,
29°59.979'N, 99°23.117' W, 29 September 2003.

A volunteer examined this site and found dead Asian clam shells.

South Fork of the Guadalupe River, at South Fork Marsh upstream of La Casita Crossing at SH
39, Kerr County, Texas, 30°00.006'N, 99°24.613'W, 29 September 2003.

A volunteer examined this site and found dead Asian clam shells.

South Fork of the Guadalupe River, La Casita Crossing at SH 39, Kerr County, Texas,
30°00.339'N, 99°24.476'W, 29 September 2003.

A volunteer examined this site and found dead Asian clam shells.

South Fork of the Guadalupe River, Mystic Crossing at SH 39, Kerr County, Texas,
30°00.708'N, 99°22.454'W, 29 September 2003.

A volunteer examined this site and found dead Asian clam shells.

South Fork of the Guadalupe River, Criders Crossing at SH 39, Kerr County, Texas,
30°01.673'N, 99°21.711'W, 4 October 2003.

A volunteer examined this site and found dead Asian clam shells.

South Fork of the Guadalupe River, Hunt Crossing at SH 39, Kerr County, Texas, 2 December
2003.

A volunteer examined this site, but found only dead Asian clam shells.

Guadalupe River, west of Ingram, ca. 300 m upstream of Rio Vista Crossing on Cade Loop off
SH 39, Kerr County, Texas, 30°04.143'N, 99°16.855'W, two dates.

July 2003.

A volunteer examined this site and reported finding a single long dead Texas lilliput, as
well as Asian clam (abundant).

12 November 2003

A volunteer reexamined this site and reported finding only Asian clams.

Guadalupe River, marshy area downstream of Ingram Lake dam, Ingram, Kerr County, Texas,
30°04.255'N, 99°15.264'W, 4 October 2003.

A volunteer examined this area and found dead Asian clam shells.

Guadalupe River, downstream of dam at Louise Hayes Park, Kerrville, Kerr County, Texas,
30°02.650'N, 99°08.547'W, 14 October 2003.

A volunteer examined this site and found dead Asian clam shells.

Guadalupe River, Flatrock County Park, southeast of Kerrville-Schreiner State Park, Kerr
County, Texas, 12 September 2003.

A volunteer examined this site, but found only dead Asian clam shells.

Guadalupe River, River Road Crossing west of Center Point, Kerr County, Texas, 11 November
2003.

A volunteer examined this site, but found only Asian clam (relatively recently dead).

Verde Creek (Guadalupe River drainage), at SH 173 at Camp Verde, Kerr County, Texas,
29°53.605'N, 99°06.311'W, 14 October 2003.

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

San Marcos River (Guadalupe River drainage), adjacent to state fish hatchery and horse pasture
ca. 3 km upstream of the confluence of the Blanco River, Hays County, Texas, two dates.
U.S. Fish and Wildlife Service personnel working at this site reported the following
specimens:

1-2 July 2003

San Marcos river near state fish hatchery				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Threeridge	0	0.5x1	very long dead	100.0

22 December 2003

San Marcos river near state fish hatchery				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas pimpleback	0	0.5x1	very long dead	100.0

San Marcos River (Guadalupe River drainage), adjacent to waste water treatment plant upstream of the Blanco River, Hays County, Texas, 1-2 July 2003.

U.S. Fish and Wildlife Service personnel working at this site reported the following specimens:

San Marcos river near state fish hatchery				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas pimpleback	0	0.5x1	very long dead	100.0

Comal River headwater springs, Landa Park, New Braunfels, Comal County, Texas, 24 November 2003.

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

Lake Wood (Guadalupe River drainage), north side on exposed banks, Gonzales County, Texas, 21 November 2003.

A volunteer examined this area and reported the following specimens:

Lake Wood, north side exposed banks				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Threeridge	3	1.0+others	recently dead	5.1+
Tampico pearlymussel	4	8.0+others	very to relatively recently dead	15.2+
Louisiana fatmucket	3	2.0	very recently dead	6.3
Yellow sandshell	12	20.0	very recently dead	40.5
Giant floater	0	11.0+	very to relatively	13.9+

Texas lilliput	1	12.0	fragments recently dead	16.5
Paper pondshell	0	2.0	very recently dead	2.5
Asian clam (very abundant)			recently dead	
Fingernail clam <i>Sphaerium transversum</i> (present)				

Lake Wood (Guadalupe River drainage), north side near boat ramp at park, Gonzales County, Texas, 21 November 2003.

A volunteer examined this area and reported the following specimens:

Lake Wood, north side near boat ramp				
Species	N alive	N shells	Condition	Percentage
Tampico pearlymussel	0	2.0+others	very recently dead	28.6+
Louisiana fatmucket	0	1.0	very recently dead	14.3
Yellow sandshell	0	1.0	very recently dead	14.3
Giant floater	0	3.0+others	very recently dead	42.9+

Guadalupe River, gravel bar area below Lake Wood dam, Gonzales County, Texas, 21 November 2003.

A volunteer examined this area and reported the following specimens:

Guadalupe River, below Lake Wood				
Species	N alive	N shells	Condition	Percentage
Threeridge	0	3.0+others	recently to relatively recently dead	27.3
Tampico pearlymussel	0	0.5x4	recently dead	36.4
Yellow sandshell	0	0.5x2	recently dead	18.2
Southern mapleleaf	0	0.5x1	recently dead	9.1
Pistolgrip	0	0.5x1	recently dead	9.1
Asian clam (very abundant)				

Guadalupe River, south side below bridge at Independence Park, Gonzales, Gonzales County, Texas, 29°29.029'N, 97°26.867'W, 26 August 2003.

A volunteer examined this site, but found only dead Asian clam shells.

Guadalupe River, north side below bridge at Independence Park, Gonzales, Gonzales County, Texas, 29°29.201'N, 97°27.355'W, 26 August 2003.

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

Spring Lake, San Marcos River headwaters at Aquarena Center, San Marcos Texas, 24 November 2003.

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

San Marcos River, at Ottine, Gonzales County, Texas, August 1988.

A volunteer reported finding a long dead three ridge at this site in the past.

San Marcos River, upstream of the confluence of the Blanco River and near the A.E. Wood State Fish Hatchery, Hays County, Texas, 14 July 2003.

US Fish and Wildlife Service personnel recovered a valve from a relatively long dead threeridge at this location.

Mud Creek at Thousand Oaks (San Antonio River drainage), San Antonio, Bexar County, Texas, 18 June 2003.

A volunteer examined this site, but did not find unionids or Asian clams.

Elm Creek at Loop 1604 (San Antonio River drainage), San Antonio, Bexar County, Texas, 18 June 2003.

A volunteer examined this site, but did not find unionids or Asian clams.

Unnamed creek at Loop 1604 and Lower Seguin Road (San Antonio River drainage), Converse - San Antonio, Bexar County, Texas, 19 June 2003.

A volunteer examined this site, but did not find unionids or Asian clams

Woman Hollering Creek at Lower Seguin Road (San Antonio River drainage), Converse - San Antonio, Bexar County, Texas, 19 June 2003.

A volunteer examined this site, but did not find unionids or Asian clams

Woman Hollering Creek at FM 1518 (San Antonio River drainage), San Antonio, Bexar County, Texas, 19 June 2003.

A volunteer examined this site, but did not find unionids. Asian clam was present.

Woman Hollering Creek at Trainer Hale Road east of FM 1518 (San Antonio River drainage), San Antonio, Bexar County, Texas, 19 June 2003.

A volunteer examined this site, but did not find unionids or Asian clams.

Woman Hollering Creek at US 10 (San Antonio River drainage), San Antonio, Bexar County, Texas, 19 June 2003.

A volunteer examined this site, but did not find unionids. Asian clam was present.

Unnamed creek at US 10 (Salatrillo Creek tributary), south of the access road just east of Pfeil Road (San Antonio River drainage), San Antonio, Bexar County, Texas, 19 June 2003.
A volunteer examined this site, but did not find unionids or Asian clams.

Salatrillo Creek at US 10, (San Antonio River drainage), San Antonio, Bexar County, Texas, 19 June 2003.
A volunteer examined this site, but did not find unionids or Asian clams.

Calaveras Reservoir (San Antonio River drainage), Bexar County, Texas, 25 June 2003.
During other work in the area, TPWD personnel found both living and dead specimens of Tampico pearlymussel, southern mapleleaf, and Asian clams.

Nueces – Frio River Drainage

Roadside drainage ditch, at SH 16 4.5 km south of Freer, Duval County, Texas, 27°48.97'N, 98°37.10'W, 19 September 2003.
A volunteer examined this location, but no bivalves were found.

Roadside drainage ditch (Atascosa River drainage), at Winship Road at power-line right-of-way north of SH 97, Wells Ranch, Pleasanton, Atascosa County, Texas 28°56.99'N, 98°30.09'W, 20 September 2003.
A volunteer examined this site, but no bivalves were found.

Ramsey Ranch Pond (Atascosa River drainage), Pleasanton, Atascosa County, Texas 28°56.63'N, 98°30.51'W, 20 September 2003.
A volunteer examined this site, but no bivalves were found.

Atascosa River, at Atascosa River Regional Park, Pleasanton, Atascosa County, 28°58.13' N, 98°28.89'W, 26 August 2003.
A volunteer examined this site and found dead Asian clam shells.

Leona River (Frio River drainage), at US 90 at Uvalde, Uvalde County, 2 September 2003.
A volunteer examined this site, but no bivalves were found.

Roadside drainage ditch (Frio River drainage), ca 8 km southwest of Vanderpool, Real County, Texas, 29°44.185'N, 99°37.223'W, 24 October 2003.
A volunteer examined this site, but no bivalves were found.

Little Dry Frio River, at SH 337, Real County, Texas, 29°43.283'N, 99°40.517'W, 24 October 2003.
A volunteer examined this site, but no bivalves were found.

East Fork Frio River, at SH 337 east of Leakey, Real County, Texas, 24 October 2003.

A volunteer examined this site and found dead Asian clam shells.

West Fork Frio River, SH 337 just east of Leakey, Real County, Texas, 29°43.383'N, 99°45.4113'W, 24 October 2003.

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

Chacon Creek (Elm Creek branch; Nueces River drainage), at FM 481 northeast of Eagle Pass, Maverick County, Texas, 28°57.74'N, 100°13.76'W, 18 September 2003.

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

Elm Creek (Chacon Creek, Nueces River drainage), at FM 481 northeast of Eagle Pass, Maverick County, Texas, 28°57.00'N, 100°14.54'W, 18 September 2003.

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

Salado Creek (Chacon Creek Nueces River drainage), at FM 481 northeast of Eagle Pass, Maverick County, Texas, 28°55.06'N, 100°16.29'W, 18 September 2003.

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

Mustang Creek (Picoso Creek; Nueces River drainage), at FM 481 northeast of Eagle Pass, Maverick County, Texas, 28°54.60'N, 100°25.80'W, 18 September 2003.

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

Nueces River, immediately below Upper Nueces Reservoir dam, east of US 83 and north of Crystal City, Zavala County, 2 September 2003.

A volunteer examined this site and found dead shells of Asian clam.

Drainage ditch (Nueces River drainage), just north of FM 1025 on US 83 north of Crystal City, Zavala County, Texas, 2 September 2003.

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

Turkey Creek (Nueces River drainage), at FM 481 near Crystal City, Zavala County, Texas, 29°05.100'N, 100°00.010'W, 18 September 2003.

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

Arroyo Nombre de Dios, at US 37 southeast of Mathis, San Patricio County, Texas, 16 December 2002.

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

Unnamed creek, at Williams Hollow near San Patricio County line, Live Oak County, Texas, 16 December 2002.

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

Salt Branch Creek at US 37, just south of FM 99, Live Oak County, Texas, 30 January 2003.
A volunteer examined this area, but no bivalves were found.

Brush Pen Hollow Creek at US 37, just south of FM 2049, Live Oak County, Texas, 30 January 2003.
A volunteer examined this area, but no bivalves were found.

Hackberry Creek at US 37, north of Three Rivers, Live Oak County, Texas, 30 January 2003.
A volunteer examined this area, but no bivalves were found.

Rock Quarry Branch at US 37, east of Three Rivers, Live Oak County, Texas, 30 January 2003.
A volunteer examined this area, but no bivalves were found.

Hailey Hollow (standing water at highway) at US 37, south of US 59, Live Oak County, Texas, 30 January 2003.
A volunteer examined this area, but not bivalves were found.

Baffin Bay – Laguna Madre Drainage

Noriecitas Creek, at SH 16 at Hebronville, Jim Hogg County, Texas, 27°18.27'N, 98°40.69'W, 19 September 2003.
A volunteer examined this site, but no bivalves were found.

Unnamed creek at US 77, 4.8 km south of Robstown, Nueces County, Texas, 2 January 2003.
A volunteer examined this site, but no bivalves were found.

Unnamed creek at US 77, 4.0 km north of Driscoll, Nueces County, Texas, 2 January 2003.
A volunteer examined this site, but no bivalves were found.

Radicha Creek at FM 1090 (east of US 77), Kleberg County, Texas, 2 January 2003.
A volunteer examined this site, but no bivalves were found.

Rio Grande Drainage

Rio Grande, inside Mariscal Canyon 1.6 km upstream of the mouth (upstream of Solis), Brewster County, Texas, UTM 0683917E, 3210416N, 25 May 2003.
Big Bend National Park (BBNP) staff reported finding the following specimen.

Rio Grande, 1.6 km upstream of Mariscal Canyon mouth				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Salina mucket	0	1.0	unstated	100.0

Rio Grande, 200 m downstream of Solis landing, Brewster County, Texas, UTM 0684579E, 3214228N, 8 May 2003.

BBNP staff reported finding the following specimen.

Rio Grande, downstream of Solis				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Salina mucket	0	0.5x1	very recently dead	100.0

The Mariscal Canyon and Solis Salina mucket specimens are significant in that they suggest that this species may have occurred further upstream than previously documented, but may still persist in that area and within Big Bend National Park. The BBNP database (obtained in January 2003) also lists an undated specimen of Salina mucket found at Santa Elena Canyon even farther upstream.

Rio Grande, mouth of Arroyo Venado in Boquillas Canyon, Brewster County, Texas, 25 April 1999.

BBNP staff recently reported finding the following specimen in an earlier collection.

Rio Grande, Boquillas Canyon				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Salina mucket	0	1.0	unstated	100.0

Rio Grande, at Black Gap Wildlife Management Area camp site 19, Brewster County, Texas, May 1998.

BBNP staff recently reported finding the following specimen in an earlier collection.

Rio Grande, Black Gap camp site 19				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Salina mucket	0	0.5x1	unstated	100.0

Rio Grande, Lower Canyons at Asa Jones pump house, Brewster County, Texas, 22 May 1998.
 BBNP staff recently reported finding the following specimen in an earlier collection.

Rio Grande, Lower Canyons at Asa Jones pump house				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas hornshell	0	0.5x1	unstated	100.0

The BBNP database also lists a second complete specimen (condition unstated) of Texas hornshell from this location in an undated collection.

Rio Grande, Lower Canyons 1.6 km downstream of Palmas Rapids (BBNP database MM 730.3), Brewster County, Texas, 25 May 1999.
 BBNP staff recently reported finding the following specimen in an earlier collection.

Rio Grande, Lower Canyons 1.6 km downstream of Palmas Rapids				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas hornshell	0	1.0	unstated	100.0

Rio Grande, Lower Canyons (BBNP database MM 721.5), Brewster County, Texas, undated.
 BBNP staff recently reported finding the following specimen in an earlier collection.

Rio Grande, Lower Canyons (BBNP 721.5)				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas hornshell	0	1.0	unstated	100.0

Rio Grande, Lower Canyons (BBNP database MM 722.8), Brewster County, Texas, 15 March 2000.

BBNP staff recently reported finding the following specimen in an earlier collection.

Rio Grande, Lower Canyons (BBNP 722.8)				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas hornshell	0	1.0+05x1	unstated	100.0

Rio Grande, Lower Canyons (BBNP database MM 720.2), Brewster County, Texas, 16 March 2000.

BBNP staff recently reported finding the following specimen in an earlier collection.

Rio Grande, vicinity of Columbia Bridge, gravel bar, Webb County, Texas, 27°40'52"N, 99°43'47"W, 1 March 2003.

LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°40'52"N, 99°43'47"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	11.0+0.5x19	relatively recently to very long dead	66.7
Yellow sandshell	0	0.5x2	very long dead	4.4
Washboard	1	5.0+0.5x2	recently dead to subfossil	17.8
Texas hornshell	0	1.0+0.5x1	recently dead	4.4
Mexican fawnsfoot	0	0.5x3	recently dead to very long dead	6.7
Asian clam (present)				

Rio Grande, vicinity of Columbia Bridge, at Los Indios Creek, Webb County, Texas, 27°40'38"N, 99°43'34"W, 1 March 2003.

LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°40'38"N, 99°43'34"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	3.0+0.5x130	relatively long dead to subfossil	92.4
Yellow sandshell	0	2.0+0.5x3	relatively long dead to subfossil	3.5
Texas hornshell	0	1.0+0.5x1	relatively recently dead	1.4
Salina mucket	0	0.5x1	relatively long dead	0.4
Mexican fawnsfoot	0	0.5x1	relatively long dead	0.7
Paper pondshell	0	2.0	relatively recently dead	1.4
Asian clam (present)				

Rio Grande, vicinity of Columbia Bridge, gravel island, Webb County, Texas, 27°40'25"N, 99°43'26"W, 1 March 2003.

LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°40'25"N, 99°43'26"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	2.0+0.5x50	very recently dead	86.7

Yellow sandshell	0	0.5x1	to subfossil very long dead	1.7
Washboard	0	2.0	relatively recently to relatively long dead	3.3
Texas hornshell	0	4.0+0.5x1	relatively long to Very long dead	8.3
Asian clam (present)				

Rio Grande, vicinity of Columbia Bridge, gravel shoal in mid-river, Webb County, Texas,
27°40'04"N, 99°43'22"W, 1 March 2003.

LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°40'04"N, 99°43'22"W				
Species	N alive	N shells	Condition	Percentage
Tampico pearlymussel	0	1.0	very long dead	50.0
Yellow sandshell	0	0.5x1	very long dead	50.0
Asian clam (present)				

Rio Grande, vicinity of Columbia Bridge, shoal on Mexican side, Webb County, Texas,
27°39'45"N, 99°43'01"W, 1 March 2003.

LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°39'45"N, 99°43'01"W				
Species	N alive	N shells	Condition	Percentage
Tampico pearlymussel	0	0.5x present	unstated	P
Yellow sandshell	0	1.0	subfossil	2.7
Washboard	0	1.0+0.5x1	relatively long dead	5.4
Texas hornshell	1	25.0+0.5x4	very recently to very long dead	81.1
Salina mucket	0	0.5x2	subfossil	5.4
Mexican fawnsfoot	0	1.0+0.5x1	recently dead	5.4
Asian clam (present)				

Rio Grande, vicinity of Columbia Bridge, Webb County, Texas, 27°39'33"N, 99°40'43"W, 1
March 2003.

LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°39'33"N, 99°40'43"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x1	very long dead	20.0
Yellow sandshell	0	0.5x2	very long dead	40.0
Washboard	0	0.5x1	very long dead	20.0
Mexican fawnsfoot	0	0.5x1	very long dead	20.0

Rio Grande, vicinity of Columbia Bridge, Webb County, Texas, 27°39'23"N, 99°41'57"W, 1 March 2003.
LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°39'23"N, 99°41'57"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x present	unstated	P
Salina mucket?	0	0.5x1	very long dead	33.3
Southern mapleleaf	1	1.0	long dead	66.7
Asian clam (present)				

Rio Grande, vicinity of Columbia Bridge, gravel and sand shoal near house, Webb County, Texas, 27°40'07"N, 99°41'23"W, 1 March 2003.
LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°40'07"N, 99°41'23"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	1	1.0+0.5xmany	long dead to subfossil	7.1
Yellow sandshell	0	0.5x1	subfossil	3.6
Washboard	2	0.0	-	7.1
Texas hornshell	0	7.0+0.5x1	very recently to long dead	21.4
Southern mapleleaf	0	1.0	recently dead	3.6
Mexican fawnsfoot	0	15.0+0.5x1	very recently to very long dead	57.1
Asian clam (present)				

Rio Grande, vicinity of Columbia Bridge, Webb County, Texas, 27°39'33"N, 99°40'55"W, 2 March 2003.

LCC personnel examined this site and found:

Rio Grande, vicinity of Columbia Bridge, 27°39'33"N, 99°40'55"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Yellow sandshell	0	1.0+0.5x1	long dead to subfossil	20.0
Texas hornshell	0	1.0+0.5x2	relatively recently to very long dead	30.0
Southern mapleleaf	0	0.5x1	recently dead	10.0
Mexican fawnsfoot	0	1.0+0.5x3	long dead to subfossil	40.0

Rio Grande, south of Santa Isabel Creek, downstream from Columbia Bridge, Webb County, Texas, 27°38'13"N, 99°37'29"W, 30 March 2003.

LCC personnel examined this site and found:

Rio Grande, south of Santa Isabel Creek, 27°38'13"N, 99°37'29"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	3	2.0+0.5x4	very recently to relatively long dead	14.8
Washboard	1	3.0	very recently dead	6.6
Texas hornshell	2	2.0	recently dead	6.6
Southern mapleleaf	1	8.0	very recently dead	14.8
Mexican fawnsfoot	1	24.0+0.5x10	very recently to recently dead	57.4
Asian clam (present)				

Rio Grande, southeast of Santa Isabel Creek mouth, downstream from Columbia Bridge, Webb County, Texas, 27°38'35"N, 99°37'13"W, 2 March 2003.

LCC personnel examined this site and found:

Rio Grande, southeast of Santa Isabel Creek, 27°38'35"N, 99°37'13"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	15.0+0.5x2	recently dead to subfossil	47.2
Yellow sandshell	0	3.0+0.5x1	recently dead to subfossil	11.1
Texas hornshell	0	4.0	recently to relatively long dead	11.1
Southern mapleleaf	1	6.0	recently to relatively long dead	19.4

Mexican fawnsfoot	0	0.5x1	very long dead	2.8
Paper pondshell	0	2.0+0.5x1	relatively recently to relatively long dead	8.3
Asian clam (present)				

Rio Grande, El Pico Road access upstream of Laredo, Webb County, Texas, 27°37'43"N, 99°35'22"W, 20 February 2003.

LCC personnel examined this site and found:

Rio Grande, Pico Road access upstream of Laredo				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x12	very long dead to subfossil	7.1
Washboard	0	1.0	recently dead	7.1
Texas hornshell	0	1.0	recently dead	85.7

Rio Grande, upstream of Laredo, Webb County, Texas, 27°37'55"N, 99°35'34"W, 2 March 2003.

LCC personnel examined this site and found:

Rio Grande, upstream of Laredo, 27°37'55"N, 99°35'34"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	1	present	-	10.0+
Washboard	0	4.0	relatively recently to relatively long dead	40.0
Texas hornshell	0	2.0	very recently to recently dead	20.2
Mexican fawnsfoot	0	1.0+0.5x1	relatively recently dead	20.0
Paper pondshell	0	0.5x1	relatively recently dead	10.0
Asian clam (present)				

Rio Grande, upstream of Laredo, Webb County, Texas, 27°37'38"N, 99°35'09"W, 2 March 2003.

LCC personnel examined this site and found:

Rio Grande, upstream of Laredo, 27°37'38"N, 99°35'09"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas hornshell	0	1.0+0.5x1	relatively long dead	50.0

Southern mapleleaf	0	1.0	relatively recently dead	25.0
Mexican fawnsfoot	0	1.0	relatively long dead	25.0

Rio Grande, upstream of Laredo, Webb County, Texas, 27°38'18"N, 99°36'46"W, 2 March 2003.

LCC personnel examined this site and found:

Rio Grande, upstream of Laredo, 27°38'18"N, 99°36'46"W				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	1.0	relatively recently dead	20.0
Mexican fawnsfoot	0	3.0	recently to relatively recently dead	60.0
Paper pondshell	0	1.0	relatively recently dead	20.0

Rio Grande, La Bota Ranch upstream of Laredo at Sombreretillo Creek, upstream and downstream sites, Webb County, Texas, 27°36'52"N, 99°33'21"W and 99°33'19"W, 02 March 2003.

LCC personnel examined this site and found:

Rio Grande, La Bota Ranch				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	several	unstated	P
Texas hornshells	0	4.0+0.5x1	relatively recently to long dead	100.0
Asian clam (present)				

Rio Grande, just downstream of World Trade Bridge 4, two bars combined, Webb County, Texas, 27°35'11"N, 99°32'12"W, 08 January 2003.

LCC personnel examined this site and found:

Rio Grande, downstream of World Trade Bridge 4				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	1.0+0.5x14	very long dead to subfossil	62.5
Yellow sandshell	0	1.0+0.5x1	relatively long dead to subfossil	8.3
Texas hornshell	0	2.0+0.5x2	long dead to subfossil	16.7

Southern mapleleaf	0	1.0	relatively long dead	4.2
Mexican fawnsfoot	0	2.0	very long dead to subfossil	8.3

Rio Grande, sand bar on the Mexican side opposite Father McNaboe Park, Webb County, Texas, 27°34'54"N, 99°31'52"W, 8 January 2003.

LCC personnel examined this site and found:

Rio Grande, Mexican side opposite Father McNaboe Park				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	3.0+0.5x45	relatively long dead to subfossil	77.4
Texas hornshell	0	7.0+0.5x2	very recently dead to subfossil	14.5
Mexican fawnsfoot	0	4.0+0.5x1	very recently dead to subfossil	8.1

Rio Grande, long bar at Father McNaboe Park, Webb County, Texas, 27°34'32"N, 99°31'28"W, 8 January 2003.

LCC personnel examined this site and found:

Rio Grande, long bar at Father McNaboe Park				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	1	6.0+0.5x36	very long dead to subfossil	76.8
Yellow sandshell	0	2.0+0.5x2	very long dead to subfossil	7.1
Washboard	0	1.0	relatively long dead	1.8
Texas hornshell	0	1.0+0.5x1	long dead to subfossil	3.6
Southern mapleleaf	0	0.5x2	relatively long to long dead	3.6
Mexican fawnsfoot	0	1.0+0.5x3	subfossil	7.1

Rio Grande, gravel island adjacent to Manadas Creek, Webb County, Texas, 27°34'07"N, 99°30'47"W, 8 January 2003.

LCC personnel examined this site and found:

Rio Grande, gravel island adjacent to Manadas Creek				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	7.0+0.5x4	very long dead to subfossil	68.8
Texas hornshell	0	0.5x2	subfossil	12.5
Salina mucket	0	0.5x1	subfossil	6.3
Mexican fawnsfoot	0	1.0+0.5x1	subfossil to subfossil	12.5

Rio Grande, at flat rock on US side, Webb County, Texas, 27°33'48"N, 99°30'43"W, 8 January 2003.

LCC personnel examined this site and found:

Rio Grande, at flat rock on US side				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x1	relatively long dead	12.5
Texas hornshell	0	3.0+0.5x2	very recently to long dead	50.0
Southern mapleleaf	0	2.0	very recently to recently dead	25.0
Mexican fawnsfoot	0	1.0	recently dead	12.5

Rio Grande, Union Pacific RR bridge, Webb County, Texas, 27°29'55"N, 99°30'58"W, 3 February 2003.

LCC personnel examined this site and found:

Rio Grande, Union Pacific RR bridge				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x7	very long dead	70.0
Texas hornshell	0	0.5x2	very long dead	20.0
Salina mucket	0	0.5x1	very long dead	10.0

Rio Grande, Union Pacific RR bridge, gravel bar off south tip of island, Webb County, Texas, 27°30'00"N, 99°30'27"W, 3 February 2003.

LCC personnel examined this site and found:

Rio Grande, Union Pacific RR bridge, bar off south tip of island				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x3	very long dead	50.0
Texas hornshell	0	0.5x1	very long dead	16.7
Salina mucket	0	0.5x2	very long dead	33.3

Rio Grande, Los Palmas Park, island and secondary channel on the Texas side of the island area between Bridge 2 upstream and Zacota Creek downstream, Laredo, Webb County, Texas, 27°30'01"N, 99°30'02"W, 22 March 2003.

LCC personnel assisted with a survey at this site and the following specimens were documented:

Los Palmas Park, island and secondary channel, Laredo				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas hornshell	0	1.0+0.5x1	recently dead	66.7
Southern mapleleaf	1	0.0	-	33.3
Asian clam (abundant)				

Rio Grande, at Webb-Zapata County line, Texas, 27°16'03"N, 99°27'00"W, 20 February 2003.

LCC personnel examined this site and documented the following species:

Rio Grande, Webb-Zapata County line				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Washboard	0	1.0	relatively long dead	33.3
Southern mapleleaf	0	2.0	relatively long dead	66.7

Rio Grande, mud bank at point across from San Ignacio, Zapata County, Texas, 27°02'41"N, 99°26'46"W, 17 January 2003.

LCC personnel examined this site and reported the following species:

Rio Grande, mud bank across from San Ignacio				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	6.0+0.5x18	relatively recently dead to subfossil	25.0
Washboard	0	1.0+0.5x1	relatively recently dead	2.1

Southern mapleleaf	0	56.0+0.5x10	very recently to very long dead	68.8
Mexican fawnsfoot	0	3.0+0.5x1	very recently to recently dead	4.2
Asian clam (present)				

Rio Grande, rock bar downstream from San Ignacio, Zapata County, Texas, 27°01'50"N, 99°26'38"W, 17 January 2003.

LCC personnel examined this site and reported the following species:

Rio Grande, rock bar downstream from San Ignacio				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	8.0+0.5x many	recently to long dead	57.1+
Southern mapleleaf	0	5.0+0.5x many	very recently to long dead	35.7+
Mexican fawnsfoot	0	0.5x1	relatively long dead recently dead	7.1
Asian clam (present)				

Rio Grande, gravel bar south of Arroyo Salano, north of Ramineno, south of San Ignacio, Zapata County, Texas, 27°01'22"N, 99°26'44"W, 17 January 2003.

LCC personnel examined this site and reported the following species:

Rio Grande, gravel bar south of Arroyo Salano				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	1	14.0+0.5x many	very recently dead to subfossil	25.4+
Yellow sandshell	0	1.0+0.5x2	recently dead to subfossil	5.1
Washboard	1	11.0+0.5x2	very recently to very long dead	23.7
Southern mapleleaf	0	27.0+0.5x many	very recently to long dead	45.8+
Mexican fawnsfoot	0	1.0	recently dead	1.7
Asian clam (present)				

Rio Grande, south gravel bar, north of Ramineno, downstream of San Ignacio, Zapata County, Texas, 27°01'15"N, 99°26'43"W, 17 January 2003.

LCC personnel examined this site and reported the following species:

Rio Grande, mud bank across from San Ignacio				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	7.0+0.5x many	very recently dead to subfossil	28.0
Yellow sandshell	0	2.0+0.5x1 many	recently dead	12.0
Washboard	0	5.0	very recently to relatively long dead	20.0
Southern mapleleaf	0	10.0+0.5x many	very recently to very long dead	40.0

Falcon Reservoir, at Falcon State Park, Zapata County, Texas, 31 August 2003.

A volunteer examined this site and found dead Asian clam shells abundant.

Rio Grande, at Roma Bridge, Roma, Starr County, Texas, 30 August 2003.

A volunteer examined this site and found dead Asian clam shells.

Rio Grande, at Salineno, Starr County, Texas, 30 August 2003.

A volunteer examined this site and found dead Asian clam shells.

Rio Grande, at Fronton, Starr County, Texas, 30 August 2003.

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

Resaca at Bentsen-Rio Grande Valley State Park, Hidalgo County, Texas, 30 August 2003.

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

Rio Grande at Tower Road, Hidalgo County, Texas, 26°03.793'N, 98°07.612'W, 2 November 2003.

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

Rio Grande at River Road, Santa Maria, Hidalgo County, Texas, 26°03.275'N, 97°49.746'W, 2 November 2003.

A volunteer examined this site and found dead Asian clam shells.

Rio Grande at River Road Levee, western part of county, Cameron County, Texas, 26°03.723'N, 97°49.746'W, 2 November 2003.

A volunteer examined this site, but bivalves were found.

Resaca north of Brownsville, at FM 1847, Cameron County, Texas, 26°10.357'N, 97°28.034'W, 1 November 2003.

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

Resaca at Prax Orive Jr. Park at Van Buren, Brownsville, Cameron County, Texas, 25°54.854'N, 97°30.135'W, 1 November 2003.

A volunteer examined this site and found dead Asian clam shells.

Resaca adjacent to cemetery, Jackson Street, Brownsville, Cameron County, Texas, 1 November 2003.

A volunteer examined this site and found dead Asian clam shells.

Resaca at Resaca Boulevard and Belthair Street, Brownsville, Cameron County, Texas, 25°55.292'N, 97°26.946'W, 1 November 2003.

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

Resaca ca 3 km south of FM 1420 at Laureles Road at the entrance to Laguna Atascosa National Wildlife Refuge, Cameron County, Texas, 26°09.559'N, 97°21.592'W, 1 November 2003.

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

Resaca east of Laureles Road at the entrance to Laguna Atascosa National Wildlife Refuge, Cameron County, Texas, 26°11.548'N, 97°21.889'W, 1 November 2003.

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

Water Body and Species Summary

The number of specimens examined annually was not documented in 1992, but from 1993 through 2003 was >2,500; >3,000; >1,700; >7,200; >1,500, >1,200; > 3,000; >3,100; <150; >1,900, and >1,260, respectively. The number of locations examined each year from 1992 through 2003 was 56, 162, 202, 179, 232, 87, 118, 136, 121, 90, 103, and 231, respectively. Among the locations examined in 2003, 28.1% yielded living specimens or very recently and recently dead shells and valves, but no unionids or their remains were found at 51.9% of these sites. Generally, too few specimens were documented and too few locations examined to allow conclusions about status of freshwater mussels at most locations in Texas in 2003. No unionids were found at a number of sites examined by volunteers that had previously supported mussel populations. Drought conditions since mid-1995 in many areas likely reduced or eliminated mussel assemblages at many of these sites.

Surveys by LCC personnel in the Rio Grande in Webb and Zapata counties produced additional specimens of washboard, Texas hornshell, Mexican fawnsfoot, and yellow sandshell. Other locations in the Rio Grande in Val Verde County also produced three living specimens of Salina mucket. These may be the only examples of this species found alive.

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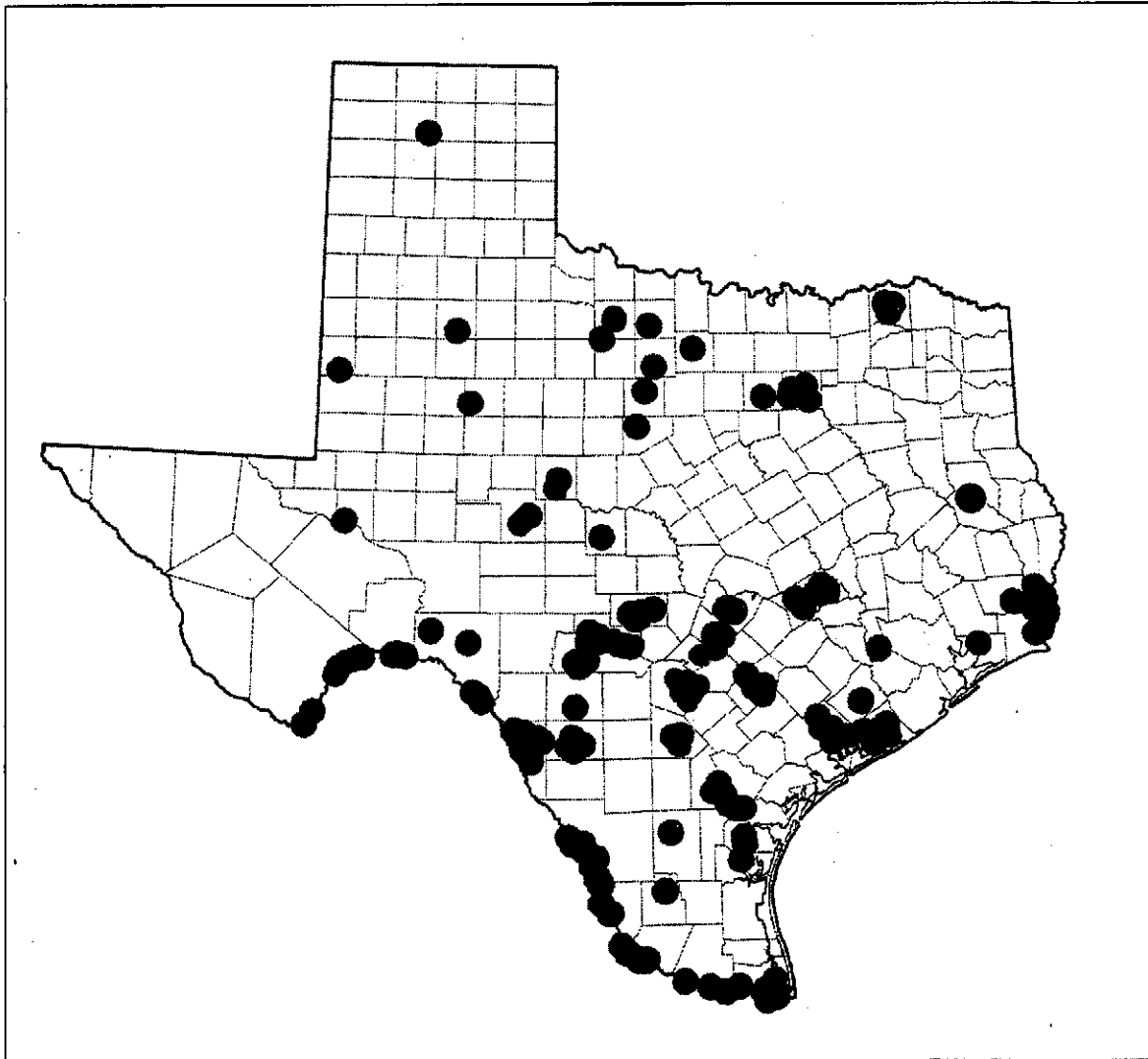


Figure 1. Locations surveyed for freshwater mussels (Family Unionidae) and other bivalves in 2003 by Texas Parks and Wildlife Department personnel or by volunteers who subsequently provided data on these sites.

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 (US 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 *Megaloniaias nervosa*

Threehorn wartyback *Obliquaria reflexa*

Southern hickorynut *Obovaria jacksoniana*

Bankclimber *Plectomerus dombeyanus*

Louisiana pigtoe *Pleurobema riddellii*

Texas hornshell *Popenaias popeii*

Texas heelsplitter *Potamilus amphichaenus*

Pink papershell *Potamilus ohioensis*

Bleufer *Potamilus purpuratus*

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

Giant floater *Pyganodon 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.