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# Atlas and checklist of the bark and ambrosia beetles of Texas and Oklahoma (Curculionidae: Scolytinae and Platypodinae)

T. H. Atkinson
University of Texas Insect Collection
3001 Lake Austin Blvd. Suite 1.314
Austin, Texas 78702
thatkinson.austin@gmail.com

E.G. Riley
Department of Entomology
Texas A&M University
College Station, Texas 77843
egrchryso@tamu.edu

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# Atlas and Checklist of the bark and ambrosia beetles of Texas and Oklahoma (Curculionidae: Scolytinae and Platypodinae)

T. H. Atkinson
University of Texas Insect Collection
3001 Lake Austin Blvd. Suite 1.314
Austin, Texas 78702
thatkinson.austin@gmail.com

E.G. Riley
Department of Entomology
Texas A&M University
College Station, Texas 77843
egrchryso@tamu.edu

**Abstract.** 180 species of bark and ambrosia beetles (Curculionidae: Scolytinae and Platypodinae) are known to occur in Texas and Oklahoma. 175 species are known from Texas, 35 of which are reported here for the first time. 78 species are known from Oklahoma, 47 of which are new records for the state. Based on overall distribution patterns the largest group of species found in Texas and virtually all known from Oklahoma are widely distributed in eastern and southeastern North America, reaching their southwestern limits here. In the case of Texas other large elements include Neotropical elements shared with Mexico and a large number found in southwestern North America. New distribution and significant new host records are discussed. Distribution maps are included for most species and a checklist is provided as an appendix.

## Introduction

Wood (1982) established the modern benchmark for the bark and ambrosia beetles (Curculionidae: Scolytinae and Platypodinae) in the U.S. in his monograph of the bark and ambrosia beetles of North and Central America. As is often the case, publication of a comprehensive treatment makes it easier to recognize new or omitted information. Since that time, large numbers of new records have been added in regional or state treatments for Indiana (Deyrup 1981, Deyrup and Atkinson 1987), Maryland (Staines 1982, Rabaglia 2003), Idaho (Furniss and Johnson 1987), Florida (Deyrup and Atkinson 1987, Atkinson and Peck 1994), Montana (Gast et al. 1989), Oregon (Furniss et al. 1992, LaBonte et al. 2005), Washington (Furniss and Johnson 1995, LaBonte et al. 2005), Delaware (Rabaglia and Valenti 2003), Ohio (Lightle et al. 2007), Michigan (Cognato et al. 2010) and Mississippi (Schiefer 2010).

Additional new records on hosts and distributions also have been published in numerous articles. A large number of exotic species have become introduced since publication of Wood's monograph (summarized by Haack 2006), many of which have significant pest potential.

Texas is a particularly interesting area biogeographically because it straddles the confluence of three major ecological regions: the mixed deciduous-conifer forests of the southeastern U.S., the arid and montane regions of southwestern North America, and the northern limits of the Neotropical flora and fauna.

This paper grew out of recent local collections by the authors that had not been previously published. The large amount of material deposited in the Texas A&M University collection by the late Karl Stephan also prompted us to include Oklahoma in this study. In addition to notes on new state and significant collection records for Texas and Oklahoma, we include a checklist in tabular format with host, distribution, and feeding habits (Appendix I). Also included are 132 maps showing collection localities for most of the species included in the checklist (Appendix II).

## Methods

Most of the information in this paper is based on relatively recently collected materials in regional collections including the following, all of which have been examined by the senior author:

| | |
|---|---|
| **EGRC** | E.G. Riley, personal collection, College Station, Texas. |
| **FSCA** | Florida State Collection of Arthropods, Gainesville, Florida. |
| **OKSU** | Oklahoma State University collection, Stillwater, Oklahoma. |
| **RHTC** | R.H. Turnbow, Jr., personal collection, Ft. Rucker, Alabama. |
| **TAMU** | Texas A&M University Collection, College Station, Texas. |
| **UTIC** | University of Texas Insect Collection, Austin, Texas. |

The data in the checklist (Appendix I) and distribution maps are based on these records as well as previously published.

## Excluded Species and Taxonomic Notes

Equihua and Burgos (1993) cited localities in eastern Texas for *Hylocurus elegans* (Eichhoff), *Stenoclyptus ruficollis* Wood, and *Hypothenemus birmanus* (Eichhoff). The first two are native to central Mexico, but have never been collected in northern Mexico nor are there any additional records from the U.S. We have seen the specimens in question and while the identifications are correct we believe that the specimens are mislabeled. The third species is possible but unlikely to be found in the Houston area. The three species are not included in this checklist.

Lanier (1970) described *Ips hoppingi* separating it from *Ips confusus* (LeConte) based on hosts, range, minute morphological differences, and limited breeding studies. Wood (1982) cited a collection from the Davis Mountains as "*confusus*" while Lanier cited material from the same location as "*hoppingi*". Neither Wood nor Lanier specified the collections where these specimens were deposited. It is very possible these were the same specimens. Cognato and Sun (2007) included *Ips* specimens collected from pinyon pine from Davis County, TX in a molecular phylogeny of worldwide *Ips* species. The TX specimens were monophyletic with *I. hoppingi* specimens collected from southern AZ and Mexico (Cognato and Sperling 2000, Cognato and Sun 2007). All Texas pinyon-feeding *Ips* are treated here as *I. hoppingi*.

Wood (1982) listed *Micracisella opacicollis* (LeConte) from Texas. After studying large numbers of specimens, including all in Wood's collection and in the U.S. National Museum, all Texas and Oklahoma specimens are treated as *Micracisella nanula* (LeConte). Likewise, although *Phloeotribus dentifrons* Blackman has been reported from Texas by Wood, all specimens from the region are treated as *Phloeotribus texanus* Schaeffer. This is not intended as a formal statement of synonymy for these species pairs. Rather, it simply reflects our opinion that the material from the limited geography or this study belongs to a single species from each pair regardless of previous publications.

Atkinson (1989) placed *Hylastes exilis* (Chapuis) in synonymy under *H. tenuis* Eichhoff. This synonymy is followed here even though it was not accepted by Wood (Wood and Bright 1992a) or Schieffer (2010).

*Dryoxylon* Bright and Rabablia is placed within the Xyleborina. Regardless of the discussion of characters given by Bright and Rabaglia (1999) this species is clearly allied with the Xyleborina. It is an ambrosia beetle (Coyle et al. 2005), which also supports its placement within the Xyleborina.

## New Records and Notes for Texas and Oklahoma

Unless otherwise indicated the following section lists new state records for Texas, Oklahoma, or both. A few notes are added for additional species when the cited collections represent significant host or biological information. Latitude and longitude are only included where these data were provided on labels.

Karl Stephan lived and did most of his collecting in Latimer County in southeastern Oklahoma (Carlton et al. 2005). Many of his specimens bear labels "5 mi. W. of Red Oak" which were collected near

his residence. Others bear labels simply as "Latimer Co.". It is not clear whether these specimens were collected at other localities or merely were shorthand for the same general area, so all of his material is listed here as "Latimer Co." His collection included many species with a few specimens collected on different dates over a long period. As a simplification, a range of years is presented here in those cases. During his lifetime a large amount of his specimens of Scolytinae and Platypodinae were deposited in the Florida State Collection of Arthropods and the Texas A&M University collection. On his death, the bulk of the residual material was transferred to Texas A&M.

Species and genera are listed alphabetically within subfamilies, tribes and subtribes following the arrangement of Wood and Bright (1992a,b), reflecting the recent consensus that the Scolytinae and Platypodinae are subfamilies of the Curculionidae rather than families in their own right. The change to subfamily rank means "demoting" each of Wood's higher groups one level in the hierarchy. Recent changes in names of subtribes follow Alonzo-Zarazaga and Lyal (2009). Alonzo-Zarazaga and Lyal (2009), based on the demonstrated phylogenetic shortcomings of Wood's classification, suggested dropping his subfamilies (now tribes) and keeping all of his tribes. In our opinion, despite known problems with Wood's classification there is still significant phylogenetic information that would be lost from following this proposal. Specifically, while Wood's Scolytini (treated by him as Scolytinae) are probably paraphyletic, the Hylesinini ( Hylesininae) are probably a monophyletic group.

A complete checklist of the bark and ambrosia beetles of Texas and Oklahoma is given in Appendix I. Distribution maps of known collection localities have been prepared for almost all species in Appendix II. References to distribution maps are included in the list below.

**New State Records for Texas and Oklahoma**

**Platypodinae**
*Euplatypus compositus* (Say). Map 1. OK: Latimer Co., K. Stephan, 1976-1994 (TAMU, 23; FSCA, 3).

*Euplatypus parallelus* (F.). Map 1, TX: Hidalgo Co.: Bentsen-Rio Grande St. Pk. (26.1801, -98.3846), J.E. King & E.G. Riley, 6-IX -2008, blacklight (TAMU, 5).

**Scolytinae**
**Hylesinini**
**Hylastina**
*Hylastes porculus* Erichson. Map 4. OK: Latimer Co., K. Stephan, II-1985 (TAMU, 1); I-1987, (TAMU, 1); IV-1987 (TAMU, 1); V-1987 (TAMU, 1); 1-XI-1976 (TAMU, 1).

*Hylastes salebrosus* Eichhoff. Map 5. OK: Latimer Co., K. Stephan, XII-96 (TAMU, 1).

**Hylesinina**
*Hylesinus fasciatus* LeConte. Map 9. OK: Latimer Co., K. Stephan, 1983-1994 (TAMU, 11). This is the southernmost and westernmost known locality for this species.

**Hylurgina**
*Dendroctonus valens* LeConte. Map 11. TX: Jeff Davis Co., Davis Mountains Resort, 2-VII-2003, D.G. Marqua, 1768 m (TAMU, 1); same locality, 6-VII-2009, E.G. Riley, beating brush pile (EGRC, 1).

**Bothrosternina**
*Cnesinus strigicollis* LeConte. Map 12. OK: Latimer Co., K. Stephan, VIII-1983 (TAMU, 1); VI-1985 (TAMU, 1).

**Phloeotribina**
*Phloeotribus liminaris* (Harris). Map 15. OK: Latimer Co., K. Stephan, VII-1983 (TAMU, 1); TX: Lamar Co.: Camp Maxey (33.7860, -95.5896), T.H. Atkinson, 30-IX-2010, *Prunus mexicana* S. Wats., THA936 (UTIC, 1); Sabine Co.: Hemphill, 8.8 mi NE, Mill Creek Cove (31.3851, -93.7090), E.G. Riley et al., 31-III-2008, flight intercept (EGRC, 1).

*Phloeotribus pseudoscabricollis* Atkinson. Map 16. TX: Cameron Co.: Sabal Palm Grove Sanct. (25.8496, -97.4185), E.G. Riley, 19-X-2008, beating palm forest vegetation (TAMU, 3); E.G. Riley, 31-X-2008, *Zanthoxylum fagara* (L.) Sarg., emerged from branch (TAMU, 50); Travis Co.: Austin, T.H. Atkinson, 18-II-2012, *Ptelea trifoliata* L., THA 970 (UTIC, 7). This species was described from a few specimens collected in Nueces and San Patricio Counties in southern Texas. The collection localities in the Rio Grande Valley are not surprising. The collections from *Z. fagara* and *P. trifoliata* (Rutaceae) are the first known host associations. Galleries were horizontal in branches as small as 3 cm in diameter. *Zanthoxylum fagara* is a common large shrub to small tree in scrublands of southern Texas and northeastern Mexico. *Ptelea trifoliata* is a small tree found widely in the eastern U.S. *Phloeotribus scabricollis* (Hopkins), a closely related species also breeds in *P. trifoliata*.

*Phloeotribus texanus* Schaeffer. Map 17. OK: Latimer Co., K. Stephan, 1983-1994 (TAMU, 16).

**Phloeosinina**

*Chramesus hicoriae* LeConte. Map 19. OK: Latimer Co., K. Stephan, 1982-1995 (TAMU, 24); TX: Concan, Neal's Lodge, E.G. Riley, 1-X-1994 (EGRC, 1); 8-IV-1995 (EGRC, 3).

*Phloeosinus taxodii taxodii* Blackman. Map 21. TX: Sabine Co.: Hemphill, 8.8 mi NE, Beech Bottom Cove (31.3851, -93.7090), E.G. Riley, 16-III-2008, Lindgren funnel (EGRC, 2).

**Hypoborina**

*Chaetophloeus mexicanus* (Blackman). Map 27. TX: Goliad Co.: Goliad, T.H. Atkinson, 28-VI-2006, *Eysenhardtia texana Scheele* (TAMU, 14), Val Verde Co.:, Seminole Canyon State Park, 20-VII-1986, J.B. Woolley & G. Zolnerowich (TAMU, 1). This species has been reported from eastern and central Mexico in *Eysenhardtia polystachya* (Fabaceae).

*Chaetophloeus sulcatus* Wood. Map 28. TX: Brewster Co.: Glass Mtns., US hwy 385, T.H. Atkinson, 26-III-2001, *Flourensia cernua* DC. (TAMU, 2); Hudspeth Co.: Sierra Blanca, 16-VIII-2006, T.H. Atkinson, *F. cernua* (TAMU,4); Mexico, Nuevo León, Montemorelos (25.25116, -99.97214), T.H. Atkinson, 15-XI-2009, *Gochnatia hypoleuca* (DC.) A. Gray (NEW HOST RECORD) THA 914 (TAMU, 8, FSCA 3). This species breeds in shrubby, woody composites. *Gochnatia hypoleuca*, reported here from Nuevo León, also occurs in West Texas.

*Liparthrum squamosum* (Blackman). Map 29. TX: Lamar Co.: Camp Maxey (33.7860, -95.5896), T.H. Atkinson, 30-IX-2010, *Maclura pomifera* (Raf.) Schneid., THA 938 (UTIC, 3); 1-X-2010, *Maclura pomifera*, THA943 (TAMU, 10; UTIC, 2); Grimes Co.: Bovay Scout Camp, 5.5 mi SW Navasota, E.G. Riley, 18-IX-2011, *M. pomifera* (EGRC, 6). This species was originally described from Mississippi (Blackman 1922). The only subsequent collection was from Indiana (Deyrup 1981). *Maclura pomifera*, the osage orange, has been widely planted outside its restricted native range in Texas and Oklahoma. Not only is this a new state record, it is the first time that the insect has been collected within the native range of its host.

**Polygraphina**

*Carphobius arizonicus* Blackman. Map 30. TX: Brewster Co., Big Bend National Park, Laguna Meadow, 1676 m, 2-VIII-2003, E.G. Riley (TAMU, 1). This seldom collected species has been previously reported from southern Arizona and New Mexico to central Mexico from species of *Juniperus*.

*Carphoborus bicornus* Wood. Map 31. OK: Latimer Co., K. Stephan, 1976-1986 (TAMU, 22, FSCA 1); TX: Lamar Co.: Camp Maxey (33.8088, -95.5504), T.H. Atkinson, 1-X-2010, *Pinus echinata* Mill., THA944 (TAMU 19, UTIC, 10, FSCA, 10).

*Carphoborus bifurcus* Eichhoff. Map 32. TX: Lamar Co.: Camp Maxey (33.8088, -95.5504), T.H. Atkinson, 1-X-2010, *Pinus echinata,* THA944, (TAMU, 1 ).

*Carphoborus convexifrons* Wood. Map 31. TX: Jeff Davis Co.: Davis Mtns. Resort, E.G. Riley & M. Yoder, 11-IV-2002, UV light (EGRC, 1); Pecos Co.: , Ft. Stockton, 28 mi S, rest stop hwy 385, E.G. Riley, 19-IV-1997 (EGRC, 1).

**Scolytini**
**Scolytina**
*Scolytus quadrispinosus* Say. Map 37. OK: Latimer Co., K. Stephan, 1979-1988 (TAMU, 3).

**Micracidina**
*Hylocurus flaglerensis* Blackman. Map 41. TX: Sabine Co.: Hemphill, 8.8 mi NE (31.3851, -93.7090), Heffern, D.J. et al., 19-XI-2007, Lindgren Funnel (EGRC, 1); E.G. Riley, 1-III-2008, flight intercept (EGRC, 2); 16-III-2008, flight intercept (EGRC, 4).

*Hylocurus floridensi*s Atkinson. Map 40. TX: Brazos Co.: College Station, Lick Ck. Pk., E.G. Riley, 26-I-1997, flight intercept (EGRC, 2); 15-II-1997, light intercept (EGRC, 1); 9-III-1997, flight intercept bottomland forest (EGRC, 1). This is the first record of this species since its description.

*Hylocurus langstoni* (Blackman). Map 42. OK: Latimer Co., K. Stephan, 1979-1996 (TAMU, 13).

*Hylocurus schwarzi* Blackman. Map 41. OK: Garvin Co., Pauls Valley, 19-V-2011, Lindgren funnel trap baited with *Ips* pheromone (USNM, 1). TX: Brazos Co., College Station (30.5883, -96.2533), E.G. Riley (TAMU, 1); Wellborn, 22-III-2007, J. Smith & C. Bogran, Lindgren funnel trap (TAMU, 1); Waller Co.: Hempsted, J. Smith & C. Bogran, 22-III-2007 (TAMU, 3); same data, 22-II-2007, bottle trap (TAMU, 1); Grimes Co.: Plantersville, 12-IV-2007, J. Smith & C. Bogran (TAMU, 1). This species was described from South Texas by Blackman from 2 specimens collected in Victoria and has not been collected since. The material cited above demonstrates that this species is not restricted to southern Texas and is relatively abundant.

*Micracis suturalis* LeConte. Map 44. OK: Latimer Co., K. Stephan, IV-1991 (TAMU, 1).

*Pseudothysanoes frondicolens* Wood. Map 47. TX: Hudspeth Co.: Allamore, 16-VIII-2006, T.H. Atkinson, dead leaves *Yucca faxoniana* Sarg., THA836 (TAMU, 14); Presidio Co.: Presidio, 29-IX-2005, T.H. Atkinson, dead leaves *Yucca treculeana* Carriere (TAMU, 9). Known previously from southern Arizona and southeastern California.

*Pseudothysanoes lecontei* Blackman. Map 48. TX: Hays Co.: Dripping Springs, 6 mi NW (30.2170, -98.1830), E.G. Riley et al., 16-XII-2005, Lindgren funnel (TAMU, 1). This represents a significant westward range extension for this species that breeds in small branches and twigs of various oaks.

*Thysanoes xylographus* Wood. Map 54. TX: Brewster Co., Big Bend National Park, Emory Peak Trail, 24-IV-2004, E.G. Riley, 2256 m (TAMU, 1).

**Dryocoetina**
*Dryocoetes granicollis* (LeConte). Map 61. OK: Delaware Co.: Flint Creek (Flint), D.E. Bowles, 8-IV-1988, black light (TAMU, 1), TX: Brazos Co.: College Station (30.5883, -96.2533), E.G. Riley, 2-V-2002, UV light (EGRC, 3); 23-V-2002, UV light (EGRC, 18); 4-VIII-2006, UV light (EGRC, 1), VIII-2006, UV light (EGRC, 1). Bright (1963) stated that the hosts were species of *Picea*, but that records from *Juglans, Castanea*, and *Abies* were likely from "accidental hosts, misidentifications, or errors in identification." Wood (1982) basically repeated this information. However, there are numerous known collection localities in the lower South and Midwest (partially shown in Map 55), which are completely outside the native range of spruces or even the climatic range within which spruces could be successfully grown as ornamentals. Most collections have been from various kinds of traps with no information on hosts. In light of its overall distribution, it seems much more likely that the principal host is actually a broadleaf species and not a conifer.

*Lymantor decipiens* (LeConte). Map 60. OK: Latimer Co., K. Stephan, VII-1985 (TAMU, 1).

**Crypturgina**
*Crypturgus alutaceus* Schwarz. Map 62. OK: Latimer Co., K. Stephan, 1985 (TAMU, 26).

**Xyloterina**
*Trypodendron scabricollis* (LeConte).Map 63. TX: Sabine Co.: Hemphill, 8.8 mi NE (31.3851, -93.7090), E.G. Riley, 16-III-2008, flight intercept (EGRC, 1).

**Xyleborina**
*Ambrosiodmus lecontei* Hopkins. Map 64. TX: Waller Co.: Hempstead, Smith, J., 19-VI-2007, Lindgren funnel (TAMU, 1); Harris Co.: Tomball, Smith, J., 5-X-2006, Lindgren funnel (TAMU, 1); Montgomery Co.: Willis, Smith, J., 5-VII-2007, Lindgren funnel (TAMU, 1).

*Ambrosiodmus rubricollis* (Eichhoff). Map 66. OK: Latimer Co., IV-2002 – VIII-2002, K. Stephan (TAMU, 10). TX: Angelina Co.: Angelina NF, 2.5 mi NE Rockland (31.0483, -94.3872), Clarke; Menard & E.G. Riley, 1996 (TAMU, 15); Angelina Co.: Angelina NF, 3 mi NE Rockland (31.0553, -94.3683), Clarke; Menard & E.G. Riley, 1996, (TAMU, 11); Angelina Co.: Angelina NF, 7 mi NE Rockland (31.0775, -94.2778), Clarke; Menard & E.G. Riley, 1996, (TAMU, 11); Angelina Co.: Angelina NF, 4 mi SE Zavala (31.1278, -94.3825), Clarke; Menard & E.G. Riley, 1996, (TAMU, 2); Angelina Co.: Angelina NF, Zavalla, 5.5 mi SE (31.1181, -94.3336), Clarke, Menard & E.G. Riley, 1996, some in pitfalls, others from Lindgren funnels (TAMU, 85); Brazos Co.: College Station, Lick Creek Pk., García, R.R., 16-IX-1995, Malaise (TAMU, 1); San Jacinto Co.: Double Lake, W.F. Chamberlin, 29-VII-1991, Malaise (TAMU, 2); Sabine Co.: Hemphill, 8.8 mi NE, R.S. Anderson & E. Morris., 25-IV-1989, flight intercept (TAMU, 1); Harris Co.: Kingswood, B. Ree, 10-III-1994 (TAMU, 1); Tyler Co.: Kirby State Forest (30.5750, -94.4175), E.G. Riley, 30-III-2003, flight intercept (TAMU, 1); Montgomery Co.: Sam Houston NF, jct. hwy 149 & 1791 (30.5369, -95.7489), E.G. Riley, 7-V-1998, flight intercept (TAMU, 1).

*Ambrosiodmus tachygraphus* (Zimmermann). Map 64. OK: Latimer Co., K. Stephan, III-1987 (TAMU, 1); IV-1990 (TAMU, 1); TX: Ft. Bend Co.: Brazos Bend St. Pk., E.G. Riley, 4-VI-2003, flight intercept (TAMU, 1).

*Ambrosiophilus atratus* (Eichhoff). Map 67. OK: Latimer Co., IV-2002, flight intercept trap, K. Stephan (TAMU, 3). TX: Sabine Co.: Hemphill, 8.8 mi NE (31.3851, -93.7090), Heffern, D.J. et al., 19-XI-2007, Lindgren Funnel (EGRC, 1); E.G. Riley, 1-III-2008, flight intercept (EGRC, 6).

*Cyclorhipidion boadoanum* (Reitter) (=*Xyleborus californicus* Wood). Map. 69. OK: Payne Co.: Stillwater, P. Edde, 1-VII-2002 (TAMU, 1); Latimer Co., K. Stephan, IV, V, VI-2002 (TAMU, 3).

*Euwallacea validus* (Eichhoff). Map 67. TX: Sabine Co.: Hemphill, 8.8 mi NE, Mill Creek Cove (31.3851, -93.7090), E.G. Riley, 16-III-2008, flight intercept (EGRC, 1).

*Xyleborus affinis* Eichhoff. Map 73. OK: Latimer Co., K. Stephan, VIII-1988 (FSCA, 1); VI-1998 (FSCA, 1).

*Xyleborus celsus* Eichhoff. Map 74. OK: Latimer Co., K. Stephan, 9-X-1976 (FSCA, 2); 18-VI-1977 (FSCA, 1).

*Xyleborus impressus* Eichhoff. Map 77. OK: Latimer Co., K. Stephan, 1977 (TAMU, 11).

*Xyleborus spinulosus* Blandford. Map 80. TX: Cameron Co.: Sabal Palm Grove, E.G. Riley, 8-IV-1994 (EGRC, 1). This is the northernmost record of a species otherwise known from Central America and lowland Mexico.

*Xyleborus viduus* Eichhoff. Map. 80. OK: Latimer Co., K. Stephan, 1981-1986 (TAMU, 20); TX: Brazos Co.: College Station, E.G. Riley, 1-XI-1996, ethanol trap (EGRC, 1); Hays Co.: Dripping Springs, 6 mi NW (30.2170, -98.1830), E.G. Riley, 17-IX-2005, flight intercept (TAMU, 1); Sabine Co.: Hemphill, 8.8 mi NE (31.3851, -93.7090), Heffern, D.J. et al., 11-VI-2007, flight intercept (EGRC, 4).

*Xyleborus xylographus* (Say). Map 81. OK: Latimer Co., K. Stephan,1977-1992 (TAMU, 21).

*Xylosandrus crassiusculus* (Motschulsky). Map 83. OK: Washington Co.: Bartlesville, *Cercis canadensis* L. (OKSU, 4); Bryan Co.: Durant, Brown, G.E. (OKSU, 2); Latimer Co., K. Stephan, 1987-1994 (TAMU,20; FSCA, 10); Payne Co.: Stillwater, P. Edde., 1-VII-2002 (TAMU, 4); Cherokee Co.: Tahlequah, D. Tidmore, *Koelreuteria formosana* Hayata (OKSU, 2); Tulsa Co.: Tulsa, Affordable Pallet Co. (OKSU, 2).

**Cryphalina**

*Hypothenemus californicus* Hopkins. Map 86. OK: Latimer Co., K. Stephan, 1978-1994 (TAMU, 32).

*Hypothenemus crudiae* (Panzer) Map 88. OK: Latimer Co., K. Stephan, 1983 (TAMU, 22).

*Hypothenemus dissimilis* (Zimmermann). Map 89. OK: Latimer Co., K. Stephan, 1983-1991 (TAMU, 26).

*Hypothenemus distinctus* Wood. Map. 90. TX: Ft. Bend Co.: Brazos Bend St. Pk., B. Raber & E.G. Riley, 29-V to 18-VI-1999, flight intercept (EGRC, 1).

*Hypothenemus eruditus* Westwood. Map 91. OK: Latimer Co., K. Stephan, 1990-1994 (TAMU, 8).

*Hypothenemus gossypii* (Hopkins). Map 92. OK: Latimer Co., K. Stephan, V-1994 (TAMU, 1); TX: Starr Co.: Falcon Lake St. Pk., J.B. Woolley 15-XII-1983 (TAMU, 6); Hidalgo Co.: Santa Ana NWR (26.0789, -98.1379),E.G. Riley, 8-II-2009, *Fraxinus berlandieri* DC., emerged dead twigs (TAMU, 1); Kenedy Co.: Sarita, 2.7 mi S, E.G. Riley, 8-X-1994, pitfall (EGRC, 1); Val Verde Co.: Seminole Canyon St. Pk., J.B. Woolley & G. Zolnerowich, 20-VII-1986 (TAMU, 1).

*Hypothenemus interstitialis* (Hopkins).Map 93. OK: Latimer Co., K. Stephan, 1982-1991 (TAMU, 29).

*Hypothenemus parvistriatus* Wood. Map 95. TX: Ft. Bend Co.: Brazos Bend St. Pk., B. Raber & E.G. Riley, 4-VI-2000 (TAMU, 2). This species was described from southern Florida and this represents a significant range extension. It is also found more widely in the Caribbean and Central and South America (Atkinson, unpublished).

*Hypothenemus seriatus* (Eichhoff). Map 97. OK: Latimer Co., K. Stephan, 1990-1992 (TAMU, 6).

*Scolytogenes jalapae* (Letzner). Map 99. TX: Travis Co., Austin, 18-IX-2011, stems of *Ipomoea cordatitriloba* Dennst., T.H. Atkinson, (UTIC, 8).

*Trischidias atoma* (Hopkins). Map 100. OK: Latimer Co., Stephan, K., 1983-1994 (TAMU, 7).

*Trischidias exigua* Wood. Map 101. OK: Latimer Co., K. Stephan, 1983-1996 (TAMU, 17); TX: Ft. Bend Co.: Brazos Bend St. Pk., B. Raber & E.G. Riley, 18-IV to 29-V-1999, flight intercept (EGRC, 1); Sabine Co.: Hemphill, 8.8 mi NE (31.3851, -93.7090), E.G. Riley, 16-III to 31-III-2008, flight intercept (EGRC, 4); Tyler Co.: Kirby St. For., B. Raber & E.G. Riley, 30-III to 27-IV-2003, flight intercept (EGRC, 2); Hidalgo Co.: Santa Ana NWR, E.G. Riley, 3-X to 17-X-2008, flight intercept (TAMU, 1).

*Trischidias striata* Atkinson. Map 102. TX: Sabine Co.: Hemphill, 8.8 mi NE, Mill Creek Cove (31.3851, -93.7090), E.G. Riley, 31-III to 13-IV-2008, flight intercept (EGRC, 4); 28-IV to 10-V-2008, flight intercept (EGRC, 1); Hidalgo Co., Santa Ana Natl. Wildlife Ref., 17-X-2008, emerged *Bernardia myricifolia* (Scheele) S. Wats., E.G. Riley (TAMU, 4).

**Corthylina**

*Araptus dentifrons* Wood. Map 103. OK: Latimer Co., K. Stephan, IV-1984 (TAMU, 1) IV-1989 (TAMU, 1; TX: Blanco Co.: 3.2 mi NW Johnson City (30.31796, -98.43555), 6-XII-2007, emerged from dead vines of *Matelea* sp. (Asclepiadaceae), E.G. Riley, (EGRC, 13). While this species has previously been reported from Texas, this is the first host record for the southwestern U.S. Other reported hosts from Florida and Mexico include other species of milkweed vines.

*Conophthorus echinatae* Wood. Map 104. OK: Latimer Co., V-1993 – VIII-1996, K. Stephan (TAMU, 13); LeFlore Co., Rich Mountain, 24-II-1992, K. Stephan (TAMU, 1). This species has not been collected since the type series from Winona, Missouri from cones of *Pinus echinata*.

*Pityophthorus consimilis* LeConte. Map 111. OK: Latimer Co., K. Stephan, 1986-1989 (TAMU, 26); TX: Lamar Co.: Camp Maxey (33.8178, -95.5278), T.H. Atkinson, 30-IX-2010, *Pinus echinata,* THA939 (UTIC, 4; TAMU, 10).

*Pityophthorus crinalis* Blackman. Map 109. OK: Latimer Co., K. Stephan, 1986-1991 (TAMU, 8).

*Pityophthorus lautus* Eichhoff. Map 112. OK: Latimer Co., K. Stephan, 1977-1995 (TAMU, 33).

*Pityophthorus pulicarius* (Zimmermann). Map 114. OK: Latimer Co., K. Stephan, 1976-1989 (TAMU, 14).

*Pityotrichus barbatus* (Blackman). Map 115. TX: Jeff Davis Co., Davis Mountains Resort, Upper Limpia Creek Canyon, E.G. Riley, 18-VII-2002, beating brush pile (EGRC, 1).

*Pseudopityophthorus asperulus* (LeConte). Map 122. OK: Latimer Co., K. Stephan, 1982-1994 (TAMU, 16); TX: Sabine Co.: Hemphill, 8.8 mi NE (31.3851, -93.7090), E.G. Riley, 16-III-2008, flight intercept trap (EGRC, 14); Hemphill, 9 mi E, R.S. Anderson & E. Morris, 19-III-1989, flight intercept (TAMU, 1); same data, 16-IV-1989 (TAMU, 4); same data, 5-VI-1989 (TAMU, 1); Tyler Co.: Kirby St. For. (30.5750, -94.4175), E.G. Riley, 30-III-2003, flight intercept (TAMU, 1).

*Pseudopityophthorus minutissimus* (Zimmermann). Map 124. OK: Latimer Co., K. Stephan, 1979-1986 (TAMU, 29); TX: Brazos Co.: College Station, E.G. Riley, 25-VII, Lindgren funnel with ethanol (EGRC, 1); TX: Sabine Co.: Hemphill, 8.8 mi NE, 31.3851, -93.7090, E.G. Riley, 16-III-2008, flight intercept trap (EGRC, 14); 31-III-2008 (EGRC, 1); TX: Houston Co.: Ratcliff Lake Rec. Area, W.F. Chamberlin, 11-VII-1996, UV light (TAMU, 1).

*Pseudopityophthorus pruinosus* (Eichhoff). Map. 125. OK: Latimer Co., K. Stephan, 1977-1994 (TAMU, 42).

*Pseudopityophthorus pubescens* Blackman. Map 126. TX: Lamar Co.: Camp Maxey, 33.7956, -95.5579, T.H. Atkinson, 2-X-2010, *Quercus falcata* Michx., THA946 (UTIC, 4); Hays Co.: Dripping Springs, 6 mi NW, 30.2170, -98.1830, E.G. Riley, 12-XI-2005 to 15-XII-2005, flight intercept trap (TAMU, 2); 16-XII-2005 to 26-I-2006 (TAMU, 10); 27-I-2006 to 24-II-2006 (TAMU,2); 25-II-2006 to 30-III-2006 (TAMU, 1).

*Pseudopityophthorus yavapaii* Blackman. Map 127. TX: Jeff Davis Co.: Davis Mts. Resort, upper Limpia Ck. Canyon, E.G. Riley, 14-IV-2002, *Quercus* sp. (TAMU, 1); Jeff Davis Co.: Ft. Davis, E.G. Riley, 6-X-1982, *Quercus* sp., emerged 5-XI to 30-XI-82 (TAMU, 10); Jeff Davis Co.: Madera Canyon, R.H. Turnbow, 28-VII-1978, *Quercus grisea* Liebm.(RHTC, 1).

*Corthylus punctatissimus* (Zimmermann). Map 130. OK: Latimer Co., K. Stephan, V-1989 (TAMU, 2); VII-1989 (TAMU,1); VII-1990 (TAMU, 1).

*Gnathotrichus pilosus* LeConte. Map 129. TX: Jeff Davis Co., Davis Mountains Resort, 1-VII-1999, black light, E.G. Riley (EGRC, 1); Jeff Davis Co., Madera Canyon rest stop, highway 118, 28-VI-1999, black light, E.G. Riley (EGRC, 1).

*Monarthrum fasciatum* (Say). Map. 131. OK: Latimer Co., K. Stephan, 1979-1983 (TAMU, 31); Payne Co.: Stillwater, P. Edde, VII-2002 (TAMU, 1).

*Monarthrum mali* (Fitch). Map 132. OK: Latimer Co., K. Stephan, 1976-1997 (TAMU, 24)

**Biogeography**

Texas and Oklahoma, especially the former, occupy an interesting biogeographical region with transitions and/or discontinuities of major North American ecosystems. To the west, the mixed conifer-deciduous forest of eastern North America gives way to the open grasslands and savannahs of the mid-continent. To the west, as rainfall drops, elevation also steadily increases. In far western Texas many shrubs characteristic of the Chihuahuan Desert appear, some of which are hosts to bark beetles. The isolated sky islands of the Guadalupe, Davis, and Chisos Mountains provide disjunct coniferous forest habitats that are similar to those which are more extensive in Arizona, New Mexico, Chihuahua and Coahuila. Finally, southern Texas, especially in coastal regions, approaches the subtropics and plants and animals of Neotropical affinity begin to appear. Some of these are of broad Neotropical distributions, while others are more restricted to the semi-arid conditions of southern Texas and northeastern Mexico.

Across some of these transitions or discontinuities there are recognizable pairs or groups of "eastern" and "western" species. In cases like the ash bark beetles *Hylesinus californicus* (Swaine), the western species overlaps with *H. aculeatus* Say, its eastern counterpart in central Texas (Map 7, 8). The two species are readily distinguished. On the other hand the sumac bark beetles *Pityophthorus virilis* Blackman (western) and *P. scriptor* Blackman (eastern) are very similar in appearance and have partly been distinguished by geographic separation. The gap is mostly due to an early lack of collecting in central Texas, now filled (Map 118, 121). Examination of localities listed by Wood (1982) and Bright (1981) also show significant differences in their respective interpretations in the central U.S. As currently described distinguishing the two species is arbitrary based on specimens examined from all parts of Texas. Either there is only one widely distributed species or the geographic boundary has not been correctly identified. A similar situation exists with the juniper bark beetles *Phloeosinus dentatus* (Say), *P. serratus* (LeConte), and *P. scopulorum neomexicanus* Blackman. The former is an eastern species while the latter two have different western distributions (Map 22, 23, 24). The three species in fact are very similar morphologically. Wood (1982) shows all three broadly co-occurring in the Edwards Plateau in central Texas. This area corresponds to a significant biogeographical break with an abrupt change in many plant and animal distributions. While it seems possible that two species occur there in narrow sympatry, it seems very unlikely that three co-occur there.

In Table 1, the overall distributions of the bark and ambrosia beetles are summarized. The three main ecological regions mentioned above are combined in different ways to yield seven basic, mutually exclusive patterns. These are discussed below. As with any generalizations particular species will fit these patterns to a greater or lesser extent and the tradeoff is between recognizing fewer, broader patterns versus more numerous, more precise patterns. The distribution pattern to which a particular species has been assigned can be seen in Appendix I. These can also be appreciated in the distribution maps.

**SENA**. The single largest group of species is those whose ranges are limited to southeastern North America (65 species). Some of these are broadly distributed from the Gulf of Mexico to southern Canada (*Hylastes porculus* Erichson*, Scolytus muticus* Say). Other are more southern (*Phloeotribus texanus* Schaeffer) or northern (*Hylesinus fasciatus* LeConte*, Trypodendron scabricollis* (LeConte)) in their ranges, but still fit the overall pattern. Many of these are host specialists in a variety of conifer and hardwood species. In most cases it appears that the western limits of the ranges of the beetles very closely follows that of their hosts and that the limits are fairly abrupt. In other words, most species found along the Atlantic coast and their host genera reach their western limits in Oklahoma and Texas. Given that most temperate species of bark and ambrosia beetles breed in woody hosts, the transition to grasslands basically means that species diversity drops precipitously to the west. Different woody host species either drop out completely as one moves westward or become restricted to riparian habitats.

| Distribution pattern | Abbreviation (Appendix) | No. Species |
|---|---|---|
| Southeastern North America, often with range extending into southeastern Canada | SENA | 66 |
| Neotropical, with range including Mexico | MEX+NT | 25 |
| Southeastern North America as well as widespread Neotropical | SE+NT | 12 |
| Species primarily distributed in SE North America but with a disjunct range including temperate montane regions of Mexico | SE+MEX | 10 |
| Distribution includes disjunct ranges in both southeastern and southwestern North America | SE+SW NA | 6 |
| Southwestern North America, often including temperate montane regions of Mexico | SWNA | 39 |
| Widespread in eastern and western North America and Mexico | NA+MEX | 1 |
| Not native to New World | Exotic | 21 |
| **Total** | | **180** |

**Table 1.** Distribution patterns of bark and ambrosia beetles found in Texas and Oklahoma. Patterns are generalized and mutually exclusive. Consequently the range of a specific species will frequently not exactly fit the overall pattern. *Dendroctonus valens* doesn't fit any pattern.

**SWNA**. The next largest subgroup consists of species found in far western Texas whose primary range consists of montane habitats of southwestern North America including ranges of northern Mexico (37 species). Some of these, such as *Dendroctonus brevicomis* LeConte, reach their northern limits in southern British Columbia. Further collecting in western Texas is likely to increase the number of species in this category. Most of these occur in Texas only in the relatively small sky islands of the Guadeloupe, Davis, and Chisos Mountains that are isolated from the larger areas of temperate forests in New Mexico and northern Mexico.

**MEX+NT.** The next largest group includes Neotropical species shared with Mexico (25 species). Most of these do not extend beyond central Texas and only one reaches into Oklahoma (*Araptus dentifrons* Wood). This group can be broken down into 2 main subgroups. The first consists of those species with broad ranges that reach their northern limits in Texas (*Euplatypus parallelus* (F.)*, Xyleborus spinulosus* Blandford*,* etc.). The main barrier to northward dispersal of more Neotropical species is probably the very dry conditions and brushy vegetation of most of southern Texas and northeastern Mexico. Some of these are only known from the area immediately adjacent to the southern Rio Grande and may only survive in this and similar riparian woodlands with greater humidity.

A second subgroup of this Neotropical element consists of those that are more restricted to Tamaulipan xeric scrubland. Some of these, such as *Dendroterus texanus* Wood*, Pseudothysanoes heliura* Wood, and *Pseudothysanoes turnbowi* Wood have only been collected in Texas. Given that they have been collected on the border and that their hosts are common in northeastern Mexico it is almost certain that they will eventually be found in Mexico as well.

| SENA species | MEX replacement species | distribution | hosts |
|---|---|---|---|
| *Chramesus chapuisii* LeConte | same species | SE+MEX | *Celtis* |
| *Cnesinus strigicollis* LeConte | same species | SE+MEX | |
| *Dendroctonus frontalis* Zimmerman | same species | SE+MEX | *Pinus* |
| *Hylastes tenuis* Eichhoff | same species | SE+SW | *Pinus* |
| *Hypothenemus rotundicollis* (Eichh.) | same species | SE+MEX | |
| *Oxoplatypus quadridentatus* (Olivier) | same species | SE+SW | *Quercus* |
| *Pagiocerus frontalis* (F.) | same species | SE+MEX | *Persea* |
| *Phloeotribus frontalis* (Olivier) | same species | SE+MEX | *Morus* |
| *Phloeotribus texanus* Schaeffer | same species | SE+MEX | *Celtis* |
| *Pityophthorus annectens* LeConte | same species | SE+SW | *Pinus* |
| *Pityophthorus confusus* Blandford | same species | SE+SW | *Pinus* |
| *Pseudopityophthorus pruinosus* (Eichh.) | same species | SE+MEX | *Quercus* |
| *Thysanoes fimbricornis* LeConte | same species | SE+MEX | |
| *Thysanoes pallens* Wood | same species | SE+MEX | |
| *Chramesus hicoriae* LeConte | *Chramesus atkinsoni* Wood | SEUS | *Carya* |
| *Dendroctonus terebrans* (Olivier) | *Dendroctonus valensi* LeConte | SEUS | *Pinus* |
| *Ips calligraphus* (Germar) | *Ips apache* Lanier | SE+SW | *Pinus* |
| *Ips avulsus* (Eichhoff) | *Ips bonanseai* Hopkins | SEUS | *Pinus* |
| *Phloeosinus taxodii taxodii* Blackman | *P. taxodii taxodiicolens* Wood | SE+MEX | *Taxodium* |
| *Phloeotribus liminaris* (Harris) | *Phloeotribus pruni* Wood | SEUS | *Prunus* |
| *Pityophthorus lautus* Eichhoff | several possibilities | SEUS | *Rhus, Toxicodendron* |
| *Pityophthorus liquidambarus* Blackman | several possibilities | SEUS | *Liquidambar* |
| *Pityophthorus pulchellus* Eichhoff | *Pityophthorus tuberculatus* Eichhoff | SE+SW | *Pinus* |
| *Pityophthorus pulicarius* (Zimmermann) | *Pityophthorus schwerdfegeri* Schedl | SEUS | *Pinus* |
| *Pseudothysanoes dislocatus* (Blackman) | *Pseudothysanoes perseae* Wood | SEUS | *Carya* |
| *Thysanoes lobdelli* Blackman | *Thysanoes xylophagus* Wood | SEUS | |
| *Xyleborus pubescens* Zimmermann | *Xyleborus intrusus* Blandford | SEUS | *Pinus* |

**Table 2**. Species common to southeastern North America and temperate montane regions of Mesoamerica or represented by similar species. In all cases the species in question is absent from southern Texas. In most cases the implied relationship is based on morphology and should be considered tentative.

**SE+NT.** Eleven species, mostly species of *Xyleborus* and *Hypothenemus* have very broad distributions in North, Central and South America in temperate as well as tropical regions. All of these are extremely polyphagous and all but one are inbreeders in which only mated females disperse. In the U.S. their distribution is limited to the eastern regions.

**SE+MEX.** A biogeographically interesting group (10 species) includes species that have disjunct distributions which include southeastern North America as well as eastern Mexico. Examples include

*Chramesus chapuisii* LeConte, *Cnesinus* strigicollis LeConte, and *Oxyplatypus* quadridentatus (Olivier). Many of these are found in hardwood hosts in montane habitats in the eastern mountain ranges of Mexico whose distributions are similarly disjunct (*Liquidambar, Celtis, Morus, Carya*). The area of disjunction is the extensive dry scrub land of southern Texas and coastal plains of northeastern Mexico. This is latter group is actually part of a larger pattern shown in Table 2.

**SE+SW.** Another component element (6 species) is listed in Table 1 and Appendix I as "SE+SW". As a general rule, conditions at high and intermediate elevations are more mesic in the eastern mountain ranges of Mexico than in the interior and western ranges. The SE+SW NA species all breed in pines or oaks, found in all mountain ranges in the southwestern U.S. and Mexico. A third group consists of 9 species restricted to eastern North America but whose closest relative occurs in temperate montane areas of Mexico. In most cases the relationship is speculative, primarily based on morphology and distribution. These species and their counterparts are also shown in Table 2. In all, there are 27 species of beetles (and presumably hosts) that were once continuously distributed across mesic temperate habitats but have now become disjunct through warming and drying conditions across lower elevations of Texas and northern Mexico since the Pleistocene.

There are a few species described from Texas that have not yet been found been found outside the state. However based on host distributions and habits it seems likely that these will eventually be found in adjacent parts of Mexico or the U.S. In terms of regions of endemism, probably the only area that would qualify would be Tamaulipan scrub of southern Texas and adjacent Mexico. *Liparthrum squamosum* (Blackman) is known only from the bois d'arc or osage orange, *Maclura pomifera* (Raf.) Schneid. Given that the presumed native distribution of the host only includes parts of Texas, Arkansas and Oklahoma this might be considered a local endemic (Map 29). On the other hand its host has been dispersed eastward by human activity and the insect has followed. Until this article the insect had only been known from Mississippi where it was described and one other locality in Indiana.

**EX.** Finally, there are 20 species found in Texas and Oklahoma that are not native to the New World. These have been introduced from a variety of regions, but most are of temperate Eurasian origin. Some of these are significant pests and disease vectors.

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**Appendix I.** Checklist of bark and ambrosia beetles known from Texas and Oklahoma.

Species are arranged alphabetically within subfamilies, tribes, and subtribes (Wood, 1982) as modified by Alonzo-Zarazaga and Lyal (2009).

The checklist is presented as a table to reduce space but also to facilitate comparisons. Explanation of columns is given below:

TX, OK: 1=present; *=new state record (information in text); ?=known from one of two states, most likely found in the other. No attempt has been made to indicate the possible presence of additional species that might occur in one or both states.

Distribution: Complete descriptions are given in Table 1 and accompanying text. Categories are mutually exclusive. SE+NT=southeastern North America as well as widespread Neotropical; MEX+NT=lowland Neotropical including Mexico; SENA= southeastern North America; SWNA=southwestern North America, often including temperate montane regions of Mexico; SE+SW=distribution includes disjunct ranges in both southeastern and southwestern North America; SE+MEX=species primarily distributed in SE North America but with a disjunct range including temperate montane regions of Mexico; EX=exotic, not native to New World.

FH (feeding habits): ph = phloeophagous, main diet phloem of hosts, "true bark beetles"; xm = xylomycetophagous, feeding on ectosymbiotic fungi introduced into host tissues, generally not consuming wood itself, ambrosia beetles; my = myelophagy, breeding in pith of twigs and small branches; sp = spermatophagy, breeding in seeds or fruits; xy = xylophagy, breeding in sapwood, consuming the wood, even though fungal staining may be visible and association suspected. In many cases the feeding habits of a particular species do not fit neatly into a particular category so a hyphenated entry is provided. For example, Xylosandrus compactus is a true ambrosia beetle, it restricts its attacks to the pith of small twigs of its hosts and is scored as "xm-my". Conophthorus edulis breeds in cones of its hosts. While it does consume the seeds, larvae and adults mine in the pith of developing cones in a manner similar to other related twig boring species (sp-my).

Hosts: Very few species are strictly limited to a single host species. Generally specificity is at the genus level or for relatively few species in related genera and is most likely the case for phloem feeding and seed feeding species. Others, especially ambrosia beetles are moderately to extremely polyphagous. In many cases there is insufficient information to determine the degree of host specificity and no information is provided. It is suspected that most of these will be shown to polyphagous to some degree.

| Species | TX | OK | Distribution | Map | FH | Hosts |
|---|---|---|---|---|---|---|
| **PLATYPODINAE** | | | | | | |
| *Euplatypus compositus* (Say) | 1 | 1* | SE+NT | 1 | xm | polyphagous |
| *Euplatypus parallelus* (F.) | 1* | | MEX+NT | 1 | xm | polyphagous |
| *Myoplatypus flavicornis* (F.) | 1 | 1 | SENA | 2 | xm | *Pinus* |
| *Oxoplatypus quadridentatus* (Olivier) | 1 | 1 | SE+SW | 3 | xm | *Quercus* |
| **SCOLYTINAE** | | | | | | |
| **Hylesinini** | | | | | | |
| **Hylastina** | | | | | | |
| *Hylastes porculus* Erichson | 1 | 1* | SENA | 4 | ph | *Pinus* |
| *Hylastes salebrosus* Eichhoff | 1 | 1* | SENA | 5 | ph | *Pinus* |
| *Hylastes tenuis* Eichhoff | 1 | 1 | SE+SW | 6 | ph | *Pinus* |
| **Hylesinina** | | | | | | |
| *Hylesinus aculeatus* Say | 1 | 1 | SENA | 7 | ph | *Fraxinus* |
| *Hylesinus californicus* (Swaine) | 1 | 1 | SWNA | 8 | ph | *Fraxinus* |
| *Hylesinus fasciatus* LeConte | | 1* | SENA | 9 | ph | *Fraxinus* |
| *Hylesinus mexicanus* (Wood) | 1 | | MEX+NT | 9 | ph | *Forestiera* |
| **Tomicina** | | | | | | |
| *Dendroctonus brevicomis* LeConte | 1 | | SWNA | 10 | ph | *Pinus* |
| *Dendroctonus frontalis* Zimmermann | 1 | 1 | SENA | 10 | ph | *Pinus* |
| *Dendroctonus terebrans* (Olivier) | 1 | 1 | SENA | 11 | ph | *Pinus* |
| *Dendroctonus valens* LeConte | 1* | | NA+MEX | 11 | Ph | *Pinus* |
| **Bothrosternina** | | | | | | |
| *Cnesinus strigicollis* LeConte | 1 | 1* | SE+MEX | 12 | my | polyphagous |
| *Pagiocerus frontalis* (F.) | 1 | | SE+MEX | 13 | sp | *Persea* |
| **Phloeotribina** | | | | | | |
| *Phloeotribus frontalis* (Olivier) | 1 | 1 | SE+MEX | 14 | ph | *Morus* |

| Species | TX | OK | Distribution | Map | FH | Hosts |
|---|---|---|---|---|---|---|
| *Phloeotribus liminaris* (Harris) | 1* | 1* | SENA | 15 | ph | *Prunus* |
| *Phloeotribus pseudoscabricollis* Atkinson | 1 | | MEX+NT | 16 | ph | *Zanthoxylum* |
| *Phloeotribus texanus* Schaeffer | 1 | 1* | SE+MEX | 17 | ph | *Celtis* |
| **Phloeosinina** | | | | | | |
| *Chramesus chapuisii* LeConte | 1 | 1 | SE+MEX | 18 | ph | *Celtis* |
| *Chramesus hicoriae* LeConte | 1* | 1* | SENA | 19 | ph | *Carya* |
| *Chramesus mimosae* Blackman | 1 | | MEX+NT | 18 | ph | Legume trees |
| *Chramesus subopacus* Schaeffer | 1 | | MEX+NT | 20 | ph | *Celtis* |
| *Chramesus varius* Wood | 1 | | MEX+NT | 19 | ph | Legume trees |
| *Phloeosinus cristatus* (LeConte) | 1 | | SWNA | 21 | ph | *Cupressus* |
| *Phloeosinus dentatus* (Say) | 1 | 1 | SENA | 22 | ph | *Juniperus* |
| *Phloeosinus hoferi* Blackman | 1 | | SWNA | 25 | ph | *Juniperus* |
| *Phloeosinus scopulorum neomexicanus* Blackman | 1 | | SWNA | 23 | ph | *Juniperus* |
| *Phloeosinus serratus* (LeConte) | 1 | | SWNA | 24 | ph | *Juniperus* |
| *Phloeosinus taxodii* Blackman | 1 | | SE+MEX | 21 | ph | *Taxodium* |
| **Hypoborina** | | | | | | |
| *Chaetophloeus fasciatus* (Blackman) | 1 | | SWNA | 26 | ph | *Prosopis* |
| *Chaetophloeus heterodoxus* (Casey) | 1 | | SWNA | | ph | *Rosaceae* |
| *Chaetophloeus mexicanus* Wood | 1* | | MEX+NT | 27 | ph | *Eysenhardtia* |
| *Chaetophloeus sulcatus* Wood | 1* | | MEX+NT | 28 | ph | Composite shrubs |
| *Liparthrum squamosum* (Blackman) | 1* | ? | SENA | 29 | ph | *Maclura pomifera* |
| **Polygraphina** | | | | | | |
| *Carphobius arizonicus* Blackman | 1* | | SWNA | 30 | ph | *Juniperus* |
| *Carphoborus bicornus* Wood | 1* | 1* | SENA | 31 | ph | *Pinus* |
| *Carphoborus bifurcus* (Chapuis) | 1* | | SENA | 32 | ph | *Pinus* |
| *Carphoborus convexifrons* Wood | 1 | | SWNA | 31 | ph | *Pinus* |

| Species | TX | OK | Distribution | Map | FH | Hosts |
|---|---|---|---|---|---|---|
| **Scolytini** | | | | | | |
| **Scolytina** | | | | | | |
| *Scolytus fagi* Walsh | 1 | ? | SENA | 33 | ph | *Celtis, Quercus* |
| *Scolytus multistriatus* (Marsham) | 1 | 1 | EX | 34 | ph | *Ulmus* |
| *Scolytus muticus* Say | 1 | 1 | SENA | 35 | ph | *Celtis* |
| *Scolytus quadrispinosus* Say | 1 | 1* | SENA | 37 | ph | *Carya* |
| *Scolytus rugulosus* (Muller) | 1 | 1 | EX | 38 | ph | *Prunus* |
| *Scolytus schevyrewi* Semenov | 1 | 1 | EX | 36 | ph | *Ulmus* |
| **Hexacolina** | | | | | | |
| *Pycnarthrum hispidum* (Ferrari) | 1 | | MEX+NT | 39 | ph | *Ficus* |
| **Micracina** | | | | | | |
| *Hylocurus binodatus* Wood | | 1 | SENA | | xy | |
| *Hylocurus flaglerensis* Blackman | 1* | | SENA | 41 | xy | |
| *Hylocurus floridensis* Atkinson | 1* | | SENA | 40 | xy | |
| *Hylocurus langstoni* (Blackman) | 1 | 1* | SENA | 42 | xy | |
| *Hylocurus parkinsoniae* Blackman | 1 | | MEX+NT | 40 | xy | |
| *Hylocurus rudis* (LeConte) | 1 | 1 | SENA | 43 | xy | polyphagous |
| *Hylocurus schwarzi* Blackman | 1 | | SENA | 41 | xy | |
| *Micracis suturalis* LeConte | ? | 1* | SENA | 44 | xy | polyphagous |
| *Micracis swainei* Blackman | 1 | ? | SENA | 44 | xy | polyphagous |
| *Micracisella nanula* (LeConte) | 1 | 1 | SENA | 45 | my | polyphagous |
| *Micracisella opacithorax* (Schedl) | 1 | | MEX+NT | 45 | my | polyphagous |
| *Pseudothysanoes acaciae* (Blackman) | 1 | | MEX+NT | 46 | ph | Legume trees |
| *Pseudothysanoes dislocatus* (Blackman) | 1 | | SENA | 46 | ph | *Carya* |
| *Pseudothysanoes frondicolens* Wood | 1* | | SWNA | 47 | ph | *Yucca* |
| *Pseudothysanoes heliura* Wood | 1 | | MEX+NT | 47 | xy | |
| *Pseudothysanoes huachucae* Blackman | 1 | | SWNA | 48 | ph | *Quercus* |

| Species | TX | OK | Distribution | Map | FH | Hosts |
|---|---|---|---|---|---|---|
| *Pseudothysanoes lecontei* Blackman | 1* | ? | SENA | 48 | ph | *Quercus* |
| *Pseudothysanoes phoradendri* Blackman | 1 | | SENA | 49 | ph | *Phoradendron* |
| *Pseudothysanoes sedulus* Blackman | 1 | | SWNA | 49 | ph | *Quercus* |
| *Pseudothysanoes turnbowi* Wood | 1 | | MEX+NT | 50 | ph | *Ulmus* |
| *Thysanoes berchemiae* Blackman | 1 | | SENA | 50 | xy | polyphagous |
| *Thysanoes fimbricornis* LeConte | 1 | | SE+MEX | 51 | xy | polyphagous |
| *Thysanoes lobdelli* Blackman | 1 | | SENA | 53 | xy | polyphagous |
| *Thysanoes pallens* Wood | 1 | | SE+MEX | 53 | xy | polyphagous |
| *Thysanoes texanus* Blackman | 1 | | MEX+NT | 54 | xy | polyphagous |
| *Thysanoes xylographus* Wood | 1* | | SWNA | 54 | xy | *Quercus* |
| **Ipina** | | | | | | |
| *Ips avulsus* (Eichhoff) | 1 | 1 | SENA | 55 | ph | *Pinus* |
| *Ips calligraphus* (Germar) | 1 | 1 | SE+SW | 56 | ph | *Pinus* |
| *Ips hoppingi* Lanier | 1 | | SWNA | 55 | ph | *Pinus* |
| *Ips grandicollis* (Eichhoff) | 1 | 1 | SENA | 57 | ph | *Pinus* |
| *Ips cribricollis* (Eichhoff) | 1 | | SWNA | 57 | ph | *Pinus* |
| *Orthotomicus caelatus* (Eichhoff) | 1 | | SENA | 58 | ph | *Pinus* |
| **Dryocoetina** | | | | | | |
| *Coccotrypes dactyliperda* (F.) | 1 | | EX | 59 | sp | Palm seeds |
| *Coccotrypes distinctus* (Motschulsky) | 1 | | EX | 59 | sp | Palm seeds |
| *Dendrocranulus cucurbitae* (LeConte) | 1 | | SWNA | 60 | my | Cucurbitaceae |
| *Dendrocranulus knausi* (Hopkins) | 1 | 1 | SWNA | 60 | my | Cucurbitaceae |
| *Dryocoetes granicollis* (LeConte) | 1* | 1* | SENA | 61 | ph | See text |
| *Lymantor decipiens* (LeConte) | 1 | 1* | SENA | 60 | xy | |
| **Crypturgina** | | | | | | |
| *Crypturgus alutaceus* Schwarz | 1 | 1* | SENA | 62 | ph | *Pinus* |

| Species | TX | OK | Distribution | Map | FH | Hosts |
|---|---|---|---|---|---|---|
| **Xyloterina** | | | | | | |
| *Trypodendron scabricollis* (LeConte) | 1* | 1 | SENA | 63 | xm | *Pinus* |
| **Xyleborina** | | | | | | |
| *Ambrosiodmus lecontei* Hopkins | 1* | | MEX+NT | 64 | xm | polyphagous |
| *Ambrosiodmus obliquus* (LeConte) | 1 | | SE+NT | 65 | xm | polyphagous |
| *Ambrosiodmus rubricollis* (Eichhoff) | 1 | 1* | EX | 66 | xm | polyphagous |
| *Ambrosiodmus tachygraphus* (Zimm.) | 1* | 1* | SENA | 64 | xm | polyphagous |
| *Ambrosiophilus atratus* (Eichhoff) | 1* | 1* | EX | 67 | xm | polyphagous |
| *Anisandrus sayi* Hopkins | 1 | | SENA | | xm | polyphagous |
| *Cnestus mutilatus* (Blandford) | 1 | | EX | 68 | xm | polyphagous |
| *Cyclorhipidion bodoanum* (Reitter) | 1 | 1* | EX | 69 | xm | polyphagous |
| *Dryoxylon onoharensis* (Murayama) | 1 | | EX | 70 | xm | polyphagous? |
| *Euwallacea validus* (Eichhoff) | 1 | ? | EX | 67 | xm | polyphagous |
| *Xyleborinus artestriatus* (Eichhoff) | 1 | | EX | | xm | polyphagous? |
| *Xyleborinus gracilis* (Eichhoff) | 1 | ? | SE+NT | 71 | xm | polyphagous? |
| *Xyleborinus saxeseni* (Ratzeburg) | 1 | 1 | EX | 72 | xm | polyphagous |
| *Xyleborus affinis* Eichhoff | 1 | 1* | SE+NT | 73 | xm | polyphagous |
| *Xyleborus celsus* Eichhoff | 1 | 1* | SENA | 74 | xm | *Carya* |
| *Xyleborus ferrugineus* (F.) | 1 | 1 | SE+NT | 75 | xm | polyphagous |
| *Xyleborus horridus* Eichhoff | 1 | | MEX+NT | 76 | xm | polyphagous |
| *Xyleborus impressus* Eichhoff | 1 | 1* | SENA | 77 | xm | polyphagous |
| *Xyleborus pubescens* Zimmermann | 1 | | SENA | 78 | xm | *Pinus* |
| *Xyleborus similis* Ferrari | 1 | | EX | 79 | xm | |
| *Xyleborus spinulosus* Blandford | 1* | | MEX+NT | 80 | xm | polyphagous |
| *Xyleborus viduus* Eichhoff | 1 | 1* | SENA | 80 | xm | |
| *Xyleborus xylographus* (Say) | 1 | 1* | SENA | 81 | xm | *Quercus* |
| *Xylosandrus compactus* (Eichhoff) | 1 | | EX | 82 | xm | polyphagous |

| Species | TX | OK | Distribution | Map | FH | Hosts |
|---|---|---|---|---|---|---|
| *Xylosandrus crassiusculus* (Motschulsky) | 1 | 1* | EX | 83 | xm | polyphagous |
| **Cryphalina** | | | | | | |
| *Cryptocarenus seriatus* Eggers | 1 | | MEX+NT | 84 | my | polyphagous |
| *Hypothenemus brunneus* (Hopkins) | 1 | | EX | 85 | ph-my | polyphagous |
| *Hypothenemus californicus* Hopkins | 1 | 1* | EX | 86 | ph-my | polyphagous |
| *Hypothenemus columbi* Hopkins | 1 | | EX | 87 | ph-my | polyphagous |
| *Hypothenemus crudiae* (Panzer) | 1 | 1* | EX | 88 | ph-my | polyphagous |
| *Hypothenemus dissimilis* (Zimmermann) | 1 | 1* | SENA | 89 | ph-my | polyphagous |
| *Hypothenemus distinctus* Wood | 1* | 1 | SENA | 90 | ph-my | polyphagous |
| *Hypothenemus erectus* LeConte | 1 | | EX | 90 | ph-my | polyphagous |
| *Hypothenemus eruditus* Westwood | 1 | 1* | SE+NT | 91 | ph-my | polyphagous |
| *Hypothenemus gossypii* (Hopkins) | 1* | 1* | MEX+NT | 92 | ph-my | polyphagous |
| *Hypothenemus interstitialis* (Hopkins) | 1 | 1* | SE+NT | 93 | ph-my | polyphagous |
| *Hypothenemus miles* (LeConte) | 1 | | SENA | 95 | ph-my | |
| *Hypothenemus obscurus* (F.) | 1 | | SE+NT | 94 | ph-my | polyphagous |
| *Hypothenemus parvistriatus* Wood | 1* | | MEX+NT | 95 | ph-my | |
| *Hypothenemus pubescens* Hopkins | 1 | | SE+NT | 95 | ph-my | polyphagous |
| *Hypothenemus rotundicollis* (Eichhoff) | 1 | 1 | SE+MEX | 96 | ph-my | polyphagous |
| *Hypothenemus seriatus* (Eichhoff) | 1 | 1* | SE+NT | 97 | ph-my | polyphagous |
| *Hypothenemus sparsus* Hopkins | 1 | | MEX+NT | 98 | ph-my | |
| *Hypothenemus squamosus* (Hopkins) | 1 | | MEX+NT | 99 | ph-my | polyphagous |
| *Hypothenemus sp. undescribed* | 1 | | SENA | | ph-my | |
| *Scolytogenes jalapae* (Letzner) | 1* | | SE+NT | 99 | ph-my | Convolvulaceae |
| *Trischidias atoma* (Hopkins) | 1 | 1* | SENA | 100 | myc | polyphagous |
| *Trischidias exigua* Wood | 1* | 1* | SE+NT | 101 | myc | |
| *Trischidias striata* Atkinson | 1* | | SENA | 102 | myc | |

| Species | TX | OK | Distribution | Map | FH | Hosts |
|---|---|---|---|---|---|---|
| **Pityophthorina** | | | | | | |
| *Araptus dentifrons* Wood | 1 | 1* | MEX+NT | 103 | ph-my | Milkweed vines |
| *Conophthorus echinatae* Wood | | 1* | SEUS | 104 | my-sp | *Pinus* |
| *Conophthorus edulis* Hopkins | 1 | | SWNA | 104 | my-sp | *Pinus* |
| *Dendroterus texanus* Wood | 1 | | MEX+NT | 105 | ph | *Jatropha dioica* |
| *Pityoborus comatus* (Zimmermann) | 1 | 1 | SENA | 105 | xm | *Pinus* |
| *Pityophthorus annectens* LeConte | 1 | 1 | SE+SW | 106 | ph | *Pinus* |
| *Pityophthorus arcanus* Bright | 1 | | SWNA | 106 | ph | *Pinus* |
| *Pityophthorus barberi* Blackman | 1 | | SWNA | 107 | ph | *Pinus* |
| *Pityophthorus brevis* Blackman | 1 | | SWNA | 108 | ph | *Pinus* |
| *Pityophthorus confertus* Swaine | 1 | | SWNA | 110 | ph | *Pinus* |
| *Pityophthorus confinis* LeConte | 1* | | SWNA | 109 | ph | *Pinus* |
| *Pityophthorus confusus* Blandford | 1 | | SE+SW | 110 | ph | *Pinus* |
| *Pityophthorus consimilis* LeConte | 1 | 1* | SENA | 111 | ph | *Pinus* |
| *Pityophthorus crassus* Blackman | 1 | | SWNA | 112 | ph | *Pinus* |
| *Pityophthorus crinalis* Blackman | 1 | 1* | SENA | 109 | ph | *Rhus* |
| *Pityophthorus deletus* LeConte | 1 | | SWNA | 111 | ph | *Pinus* |
| *Pityophthorus grandis* Blackman | 1 | | SWNA | 113 | ph | *Pinus* |
| *Pityophthorus guatemalensis* Blandford | 1 | | SWNA | 112 | ph | *Quercus* |
| *Pityophthorus lautus* Eichhoff | 1 | 1* | SENA | 112 | ph | *Rhus, Toxicodendron* |
| *Pityophthorus liquidambarus* Blackman | 1 | | SENA | 113 | ph | *Liquidambar* |
| *Pityophthorus pulchellus* Eichhoff | 1 | | SE+SW | 115 | ph | *Pinus* |
| *Pityophthorus pulicarius* (Zimmermann) | 1 | 1* | SENA | 114 | ph-my | *Pinus* |
| *Pityophthorus pullus* (Zimmermann) | 1 | | SENA | 115 | ph | *Pinus* |
| *Pityophthorus schwarzi* Blackman | 1 | | SWNA | 116 | ph | *Pinus* |
| *Pityophthorus schwerdtfegeri* Schedl | 1 | | SWNA | 117 | ph-my | *Pinus* |
| *Pityophthorus scriptor* Blackman | 1 | 1 | SENA | 118 | ph | *Rhus* |

| Species | TX | OK | Distribution | Map | FH | Hosts |
|---|---|---|---|---|---|---|
| *Pityophthorus tuberculatus* Eichhoff | 1 | | SWNA | 119 | ph | *Pinus* |
| *Pityophthorus venustus* Blackman | 1 | | SWNA | 120 | ph | *Pinus* |
| *Pityophthorus virilis* Blackman | 1 | | SWNA | 121 | ph | *Rhus* |
| *Pityotrichus barbatus* (Blackman) | 1 | | SWNA | 115 | ph | *Pinus* |
| *Pseudopityophthorus asperulus* (LeConte) | 1 | 1* | SENA | 122 | ph | *Quercus* |
| *Pseudopityophthorus denticulus* Wood | 1 | | SWNA | 123 | ph | *Quercus* |
| *Pseudopityophthorus minutissimus* (Zimmermann) | 1* | 1* | SENA | 124 | ph | *Quercus* |
| *Pseudopityophthorus pruinosus* (Eichhoff) | 1 | 1* | SE+MEX | 125 | ph | *Quercus* |
| *Pseudopityophthorus pubescens* Blackman | 1* | 1 | SENA | 126 | ph | *Quercus* |
| *Pseudopityophthorus yavapaii* Blackman | 1* | | SWNA | 127 | ph | *Quercus* |
| **Corthylina** | | | | | | |
| *Corthylus punctatissimus* (Zimmermann) | | 1* | SENA | 130 | xm | polyphagous |
| *Gnathotrichus denticulatus* Blackman | 1 | | SWNA | 128 | xm | *Pinus* |
| *Gnathotrichus materiarius* (Fitch) | 1 | 1 | SENA | 129 | xm | polyphagous |
| *Gnathotrichus pilosus* (LeConte) | 1* | | SWNA | 129 | xm | |
| *Monarthrum dentigerum* (LeConte) | 1 | | SWNA | 130 | xm | *Quercus* |
| *Monarthrum fasciatum* (Say) | 1 | 1* | SENA | 131 | xm | polyphagous |
| *Monarthrum mali* (Fitch) | 1 | 1* | SENA | 132 | xm | polyphagous |

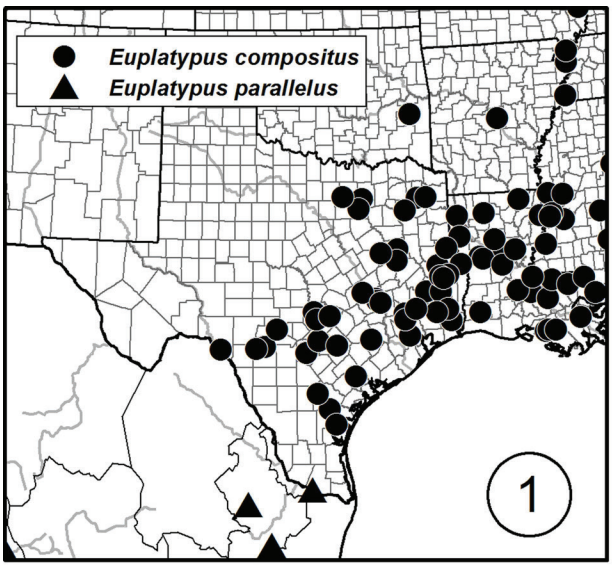
**Appendix II.** Distribution maps of species of bark and ambrosia beetles known from Texas and Oklahoma.

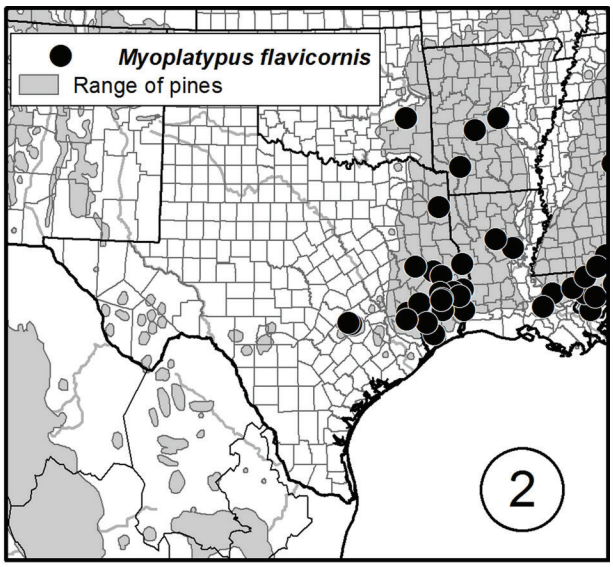
The following maps were prepared from label data of specimens examined by the authors, published in reliable sources, or both. The complete data set is available in electronic format on request to the senior author or at www.barkbeetles.info/datasets/. Data points from the entire New World distributions of included species were taken from over 100 publications, not all of which appear on these maps. Additional records were downloaded from the Michigan State University Collection online database (Anonymous 2011). To the best of our knowledge, the distribution maps are complete for all included species from the published data and collections cited below.

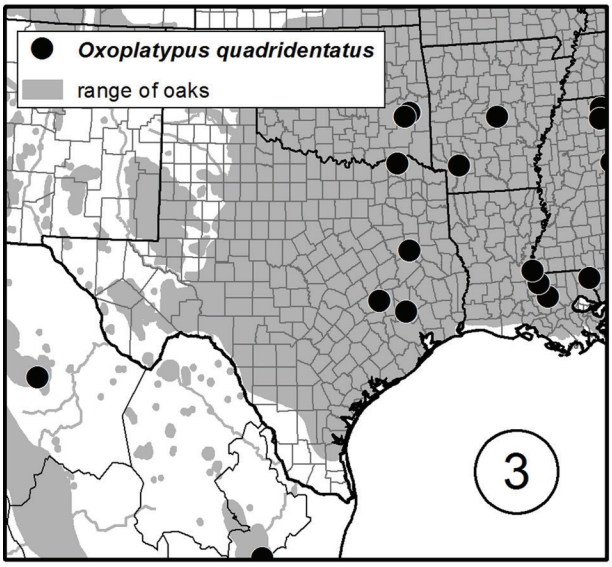
In some maps host distributions are shown. These are taken from Critchfield and Little (1966) and Little (1971). Digital versions of these host species distributions were downloaded from (Thompson et al. 1999). In most cases, the distributions for a group of related species were combined in specific maps to simplify (e.g., all species of hickories, Carya spp.). Most species, so far as is known, are not restricted to a single host species, but rather breed in all or most species of a given genus such as Ulmus (elms), Fraxinus (ashes), Pinus (pines), etc.

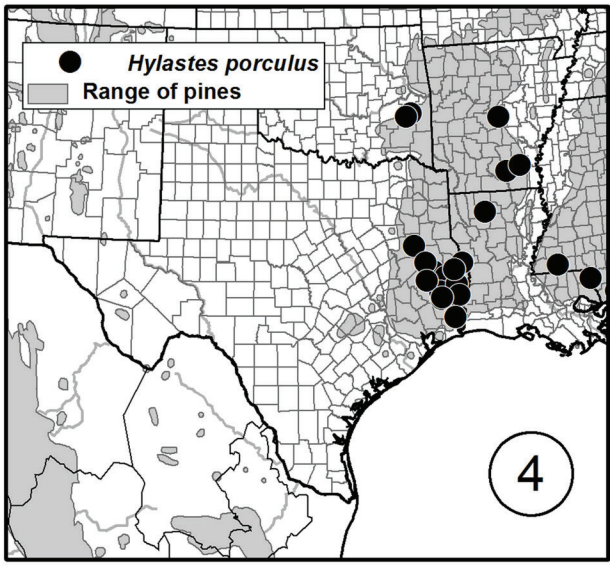
For convenience and purposes of direct comparison, the collection localities of all species are projected onto the same base map, centered on Texas and Oklahoma, but also showing parts of Louisiana, Arkansas, New Mexico, Chihuahua, Coahuila, and Tamaulipas. In almost all cases the full distribution for a particular species covers a much wider area. Due to patchiness in collection effort in some areas, particularly southern Texas and northeastern Mexico, the full distribution pattern as tabulated in the section on biogeography (Table 1, Appendix I) may not be fully apparent from these maps alone.

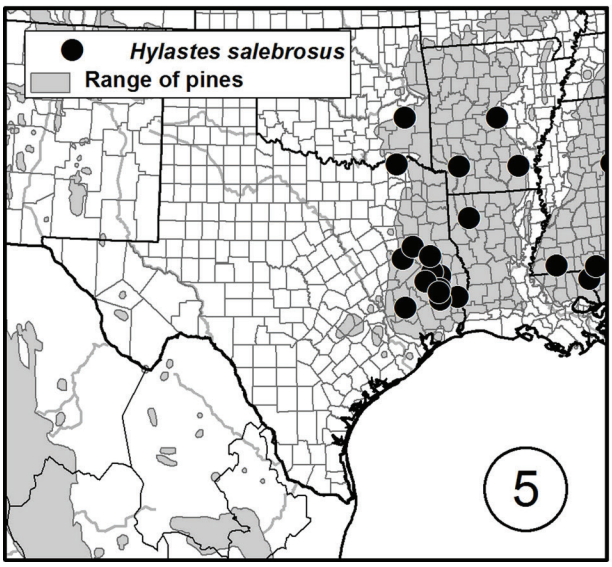
In some cases, 2 or more species were included in the same map. These species were chosen because their distributions do not overlap within the range of the maps or because there are so few known collections that it is premature to infer their distributions based only on collection.

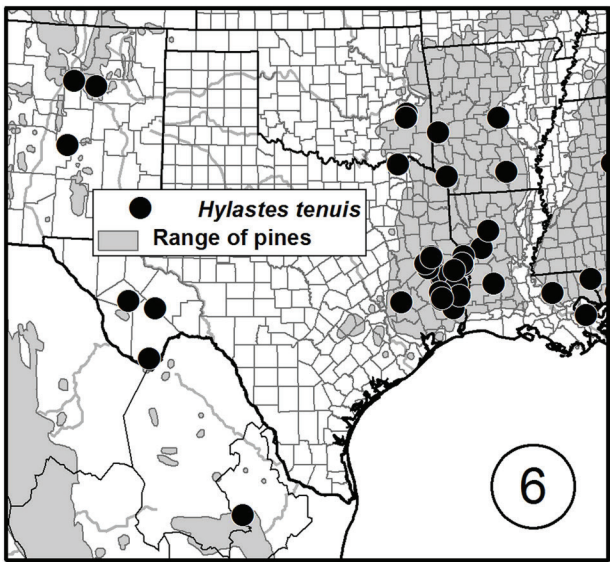

Euplatypus compositus
Euplatypus parallelus
1

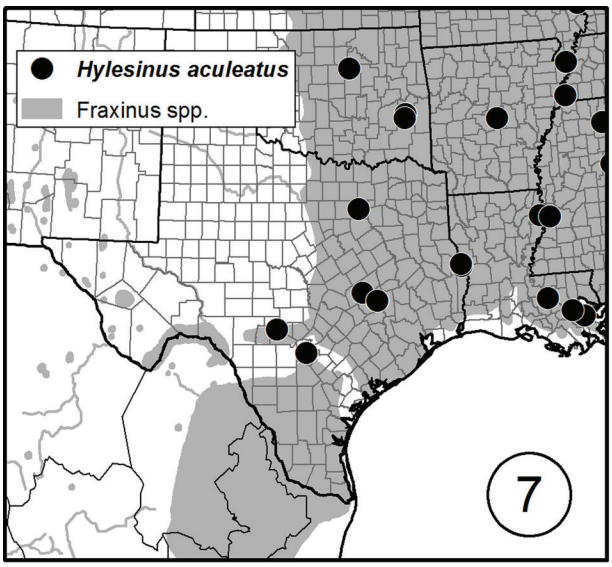

Myoplatypus flavicornis
Range of pines
2

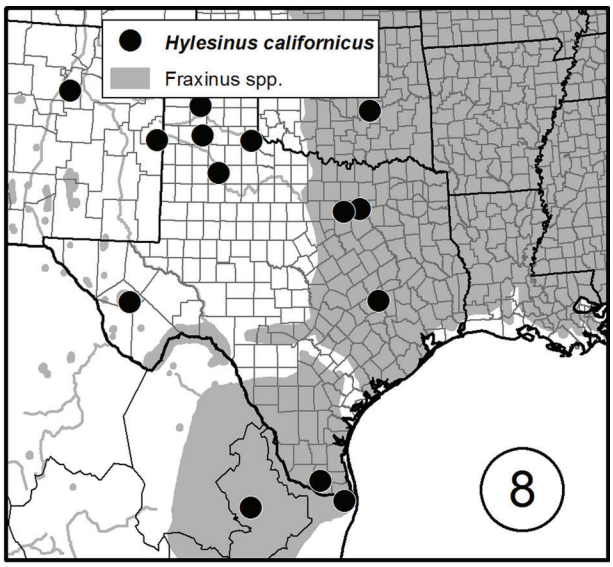

Oxoplatypus quadridentatus
range of oaks
3

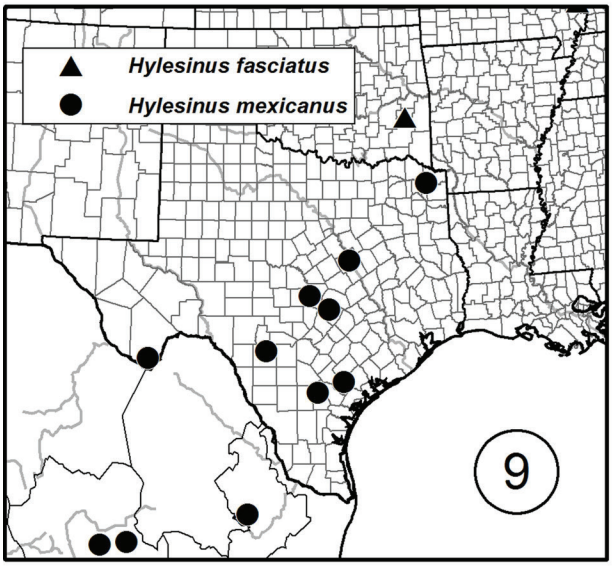

Hylastes porculus
Range of pines
4

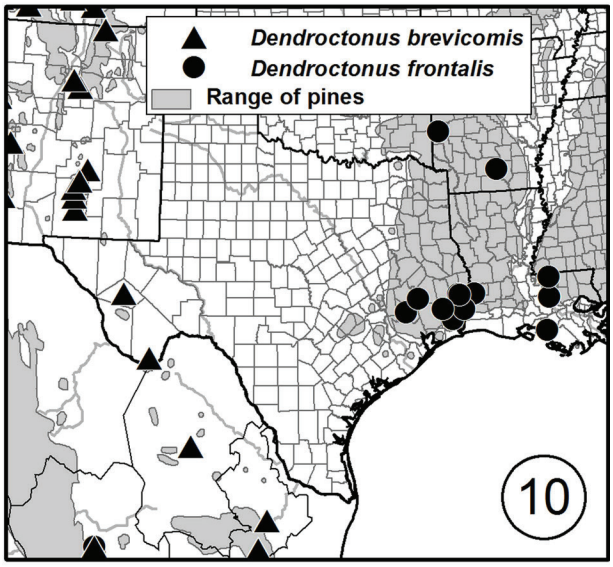

Hylastes salebrosus
Range of pines
5

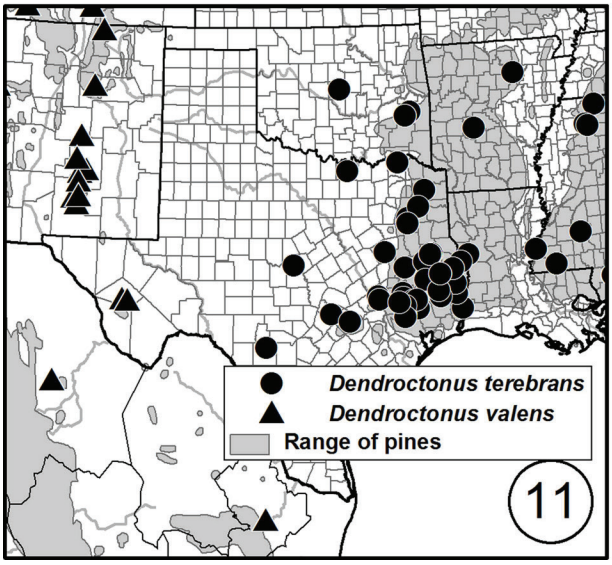

Hylastes tenuis
Range of pines
6

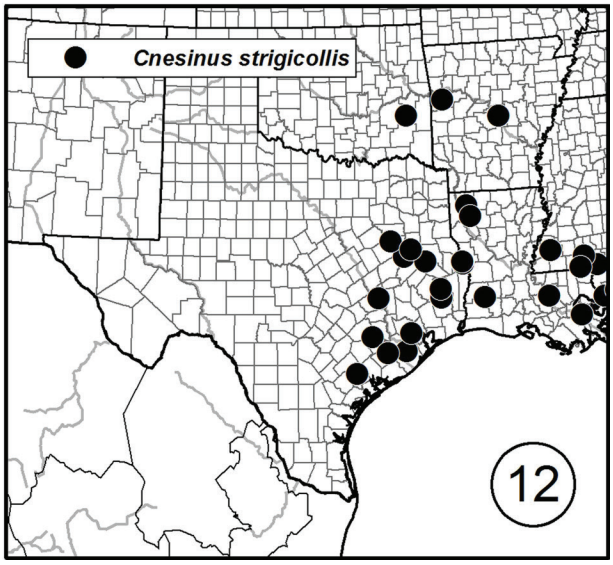

Hylesinus aculeatus
Fraxinus spp.
7

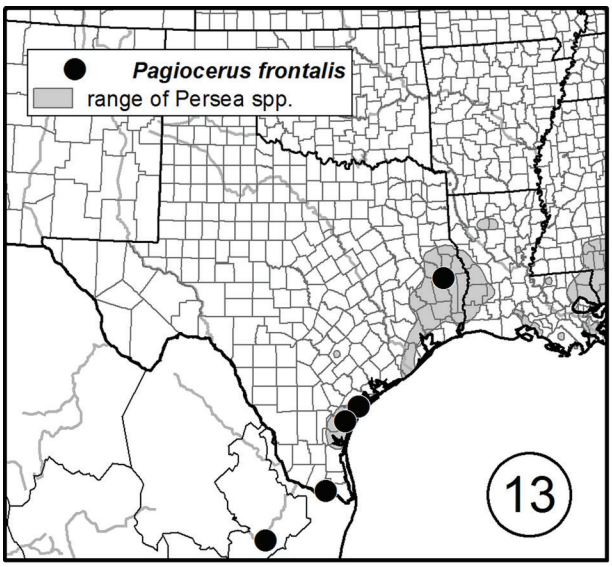

Hylesinus californicus
Fraxinus spp.
8

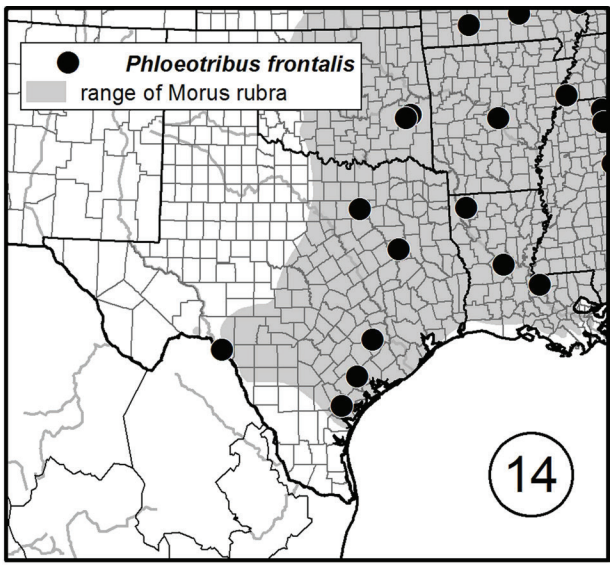

Hylesinus fasciatus
Hylesinus mexicanus
9

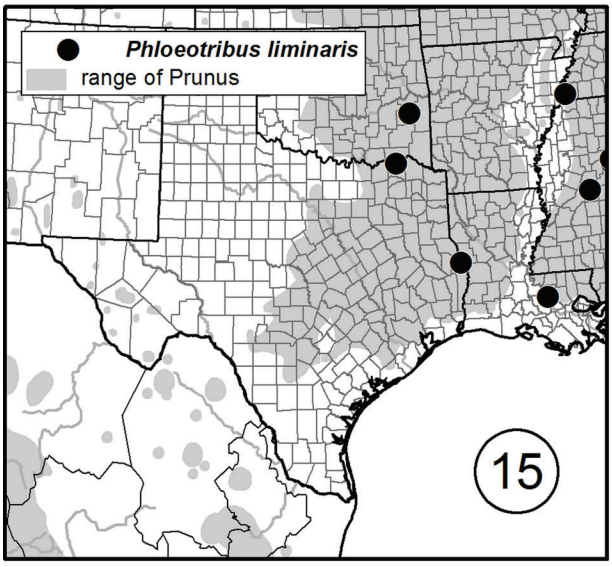

Dendroctonus brevicomis
Dendroctonus frontalis
Range of pines
10

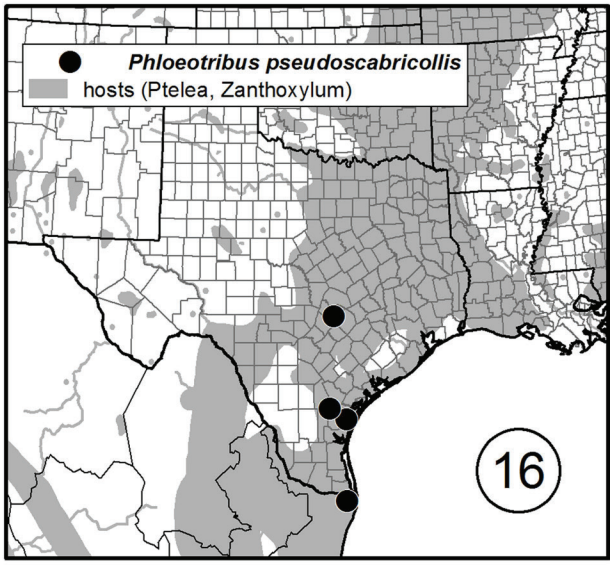

Dendroctonus terebrans
Dendroctonus valens
Range of pines
11

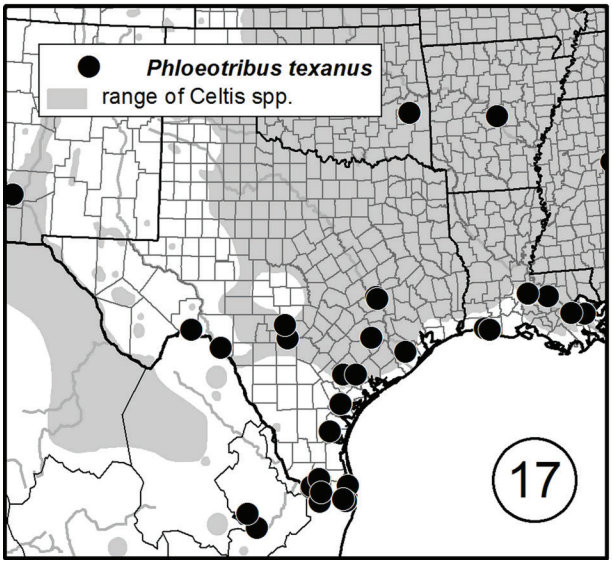

Cnesinus strigicollis
12

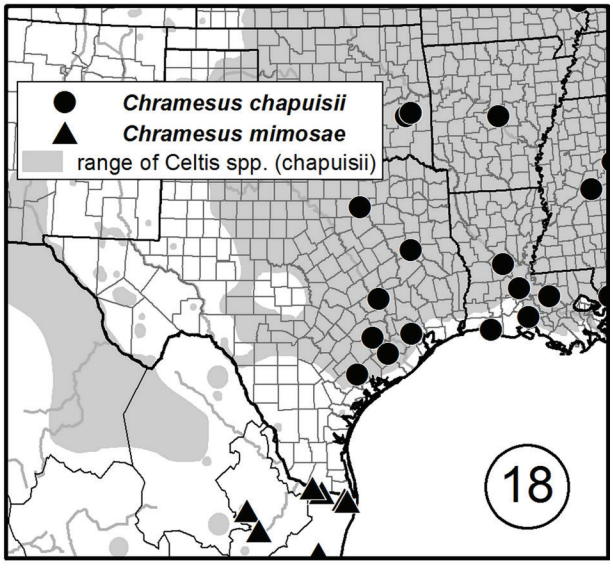

Pagiocerus frontalis
range of Persea spp.
13

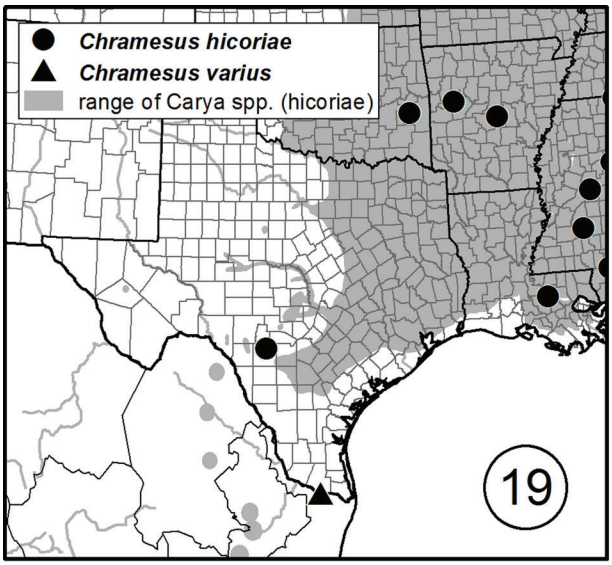

Phloeotribus frontalis
range of Morus rubra
14

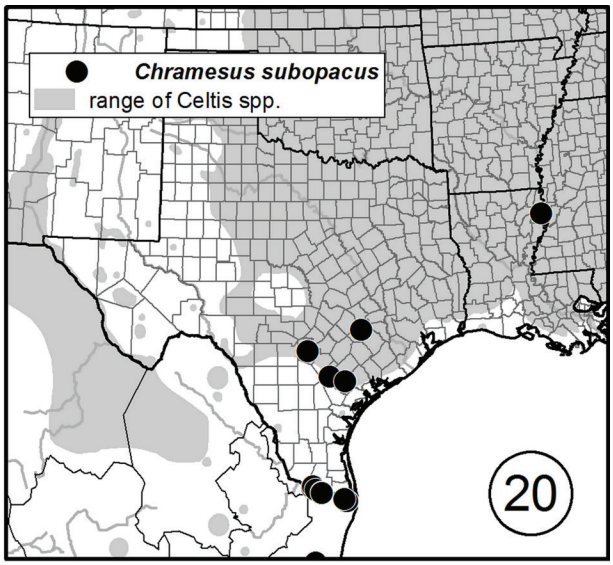

Phloeotribus liminaris
range of Prunus
15

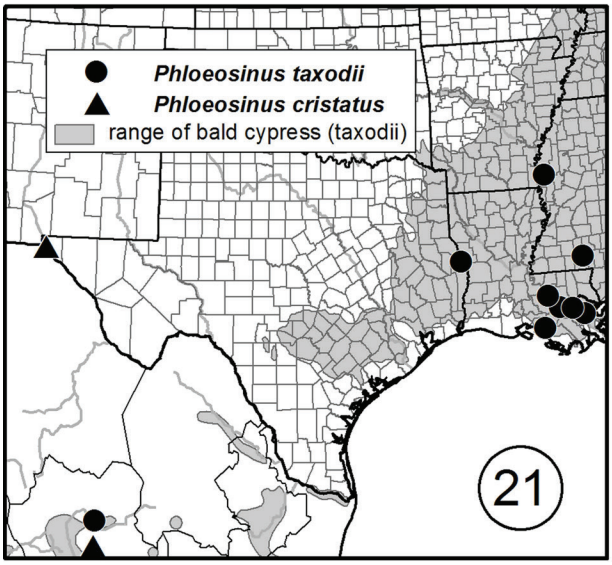

Phloeotribus pseudoscabricollis
hosts (Ptelea, Zanthoxylum)
16

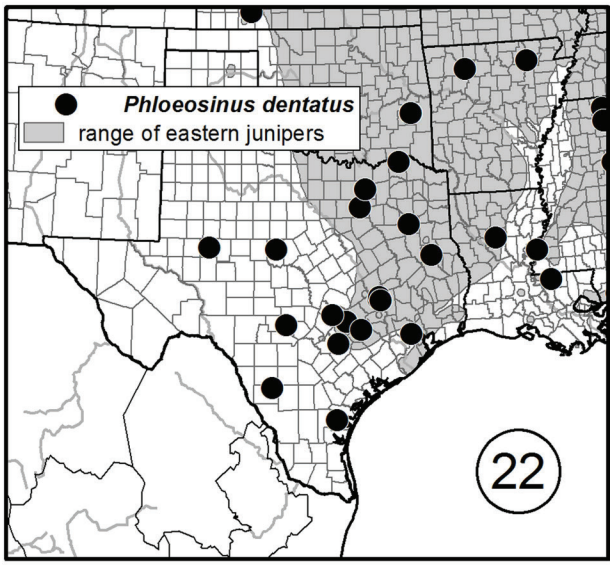

Phloeotribus texanus
range of Celtis spp.
17

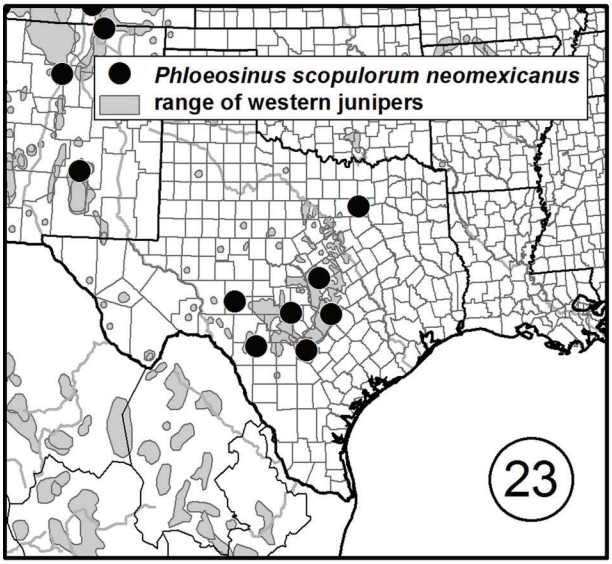

Chramesus chapuisii
Chramesus mimosae
range of Celtis spp. (chapuisii)
18

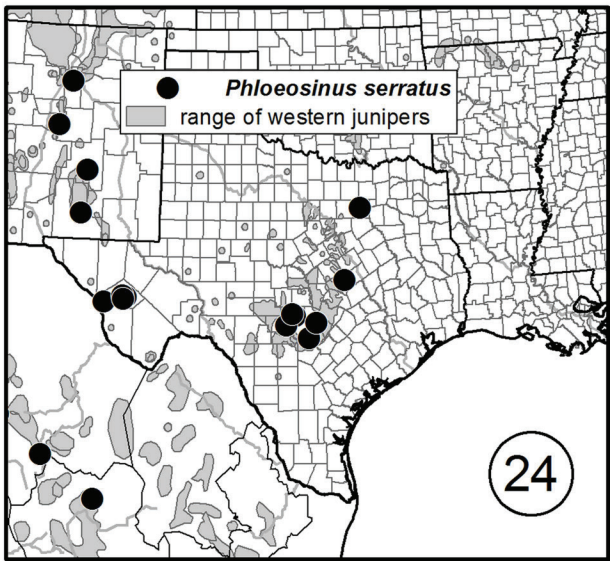

Chramesus hicoriae
Chramesus varius
range of Carya spp. (hicoriae)
19

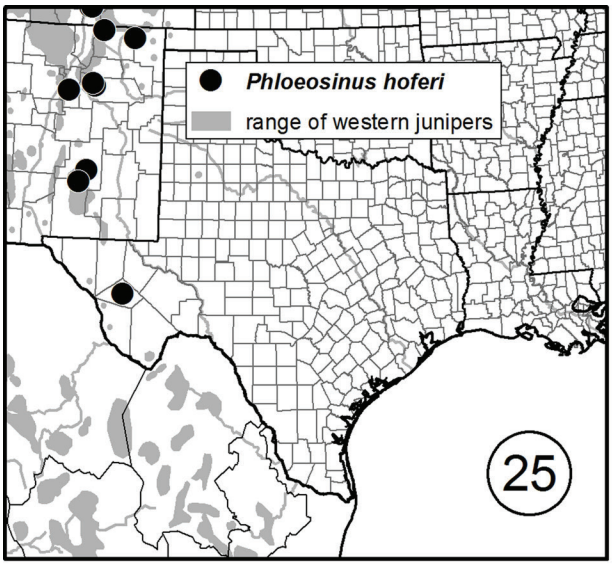

Chramesus subopacus
range of Celtis spp.
20

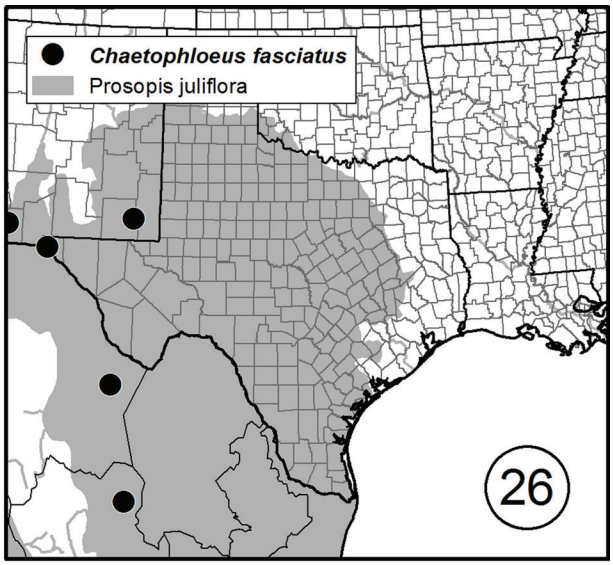

Phloeosinus taxodii
Phloeosinus cristatus
range of bald cypress (taxodii)
21

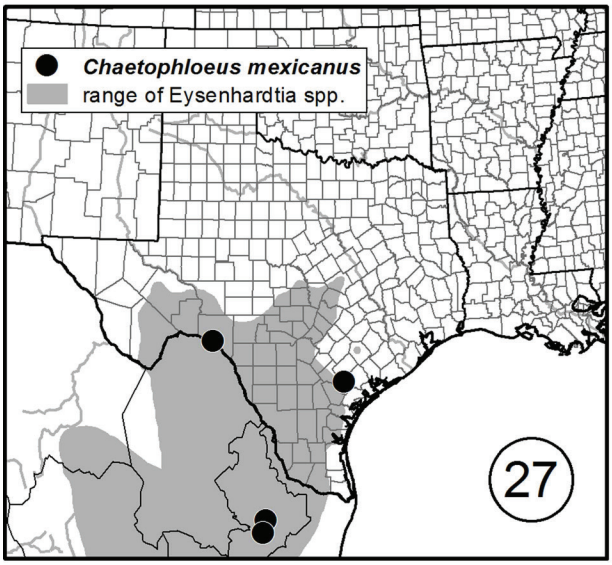

Phloeosinus dentatus
range of eastern junipers
22

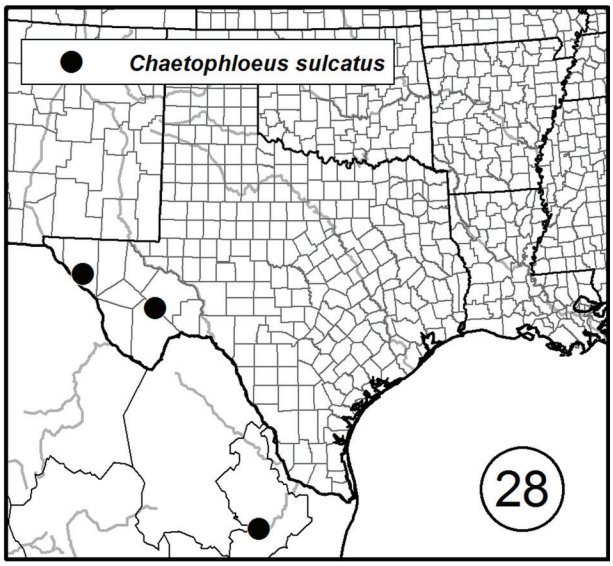

Phloeosinus scopulorum neomexicanus
range of western junipers
23

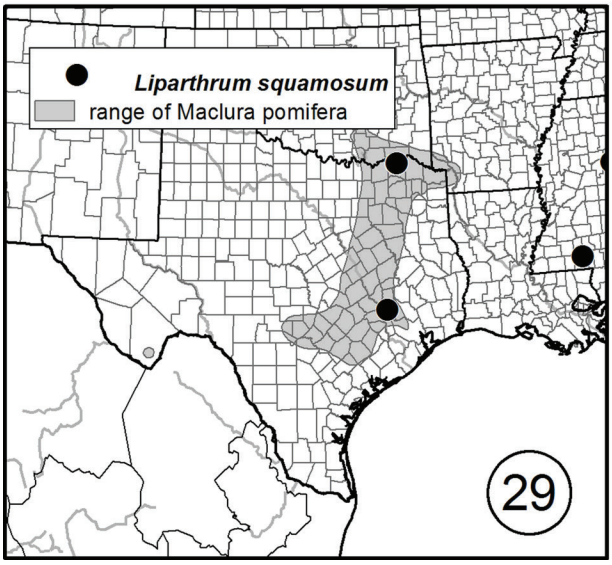

Phloeosinus serratus
range of western junipers
24

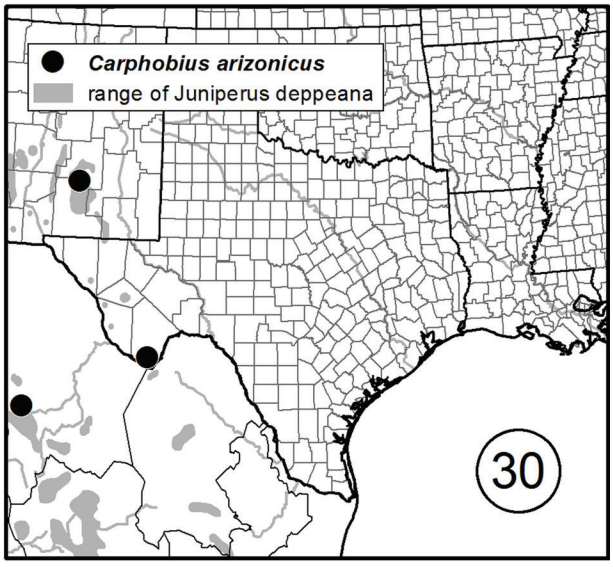

Phloeosinus hoferi
range of western junipers
25

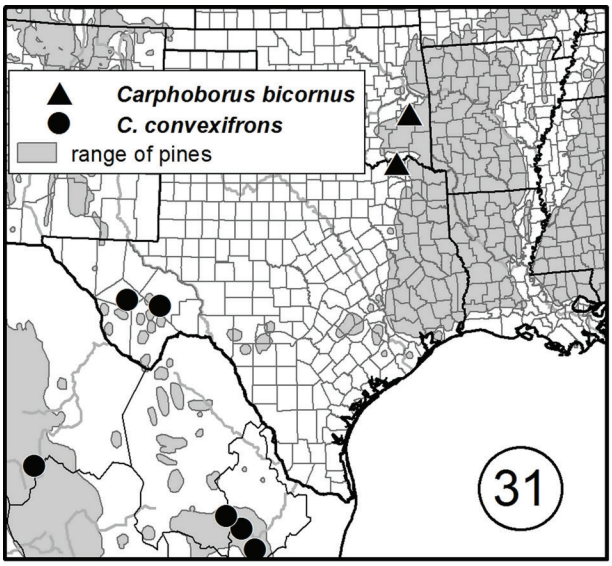

Chaetophloeus fasciatus
Prosopis juliflora
26

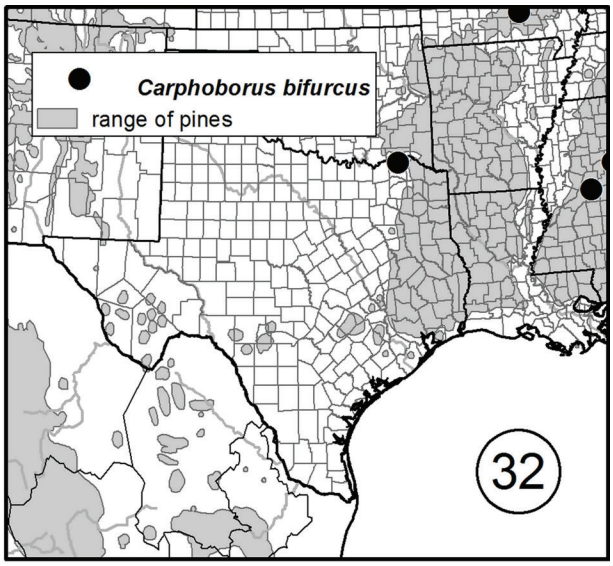

Chaetophloeus mexicanus
range of Eysenhardtia spp.
27

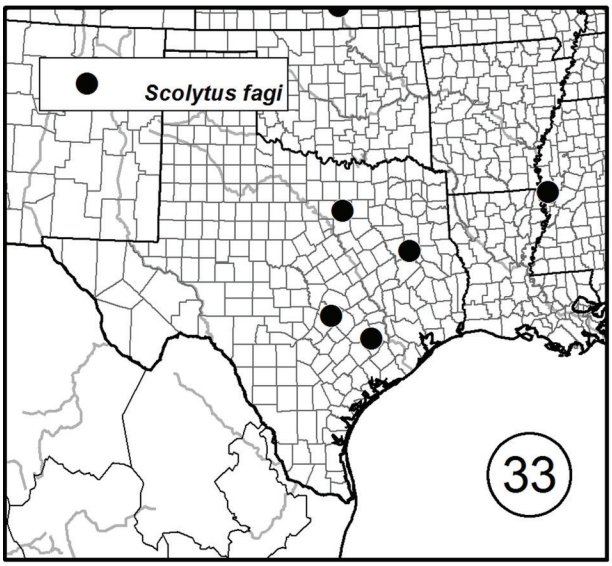

Chaetophloeus sulcatus
28

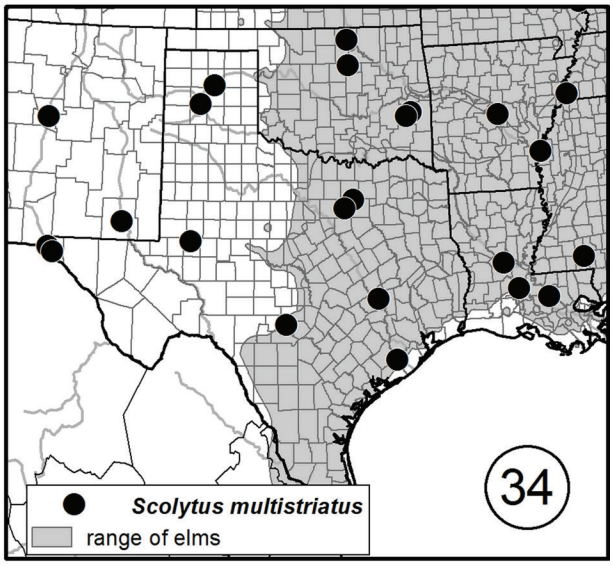

Liparthrum squamosum
range of Maclura pomifera
29

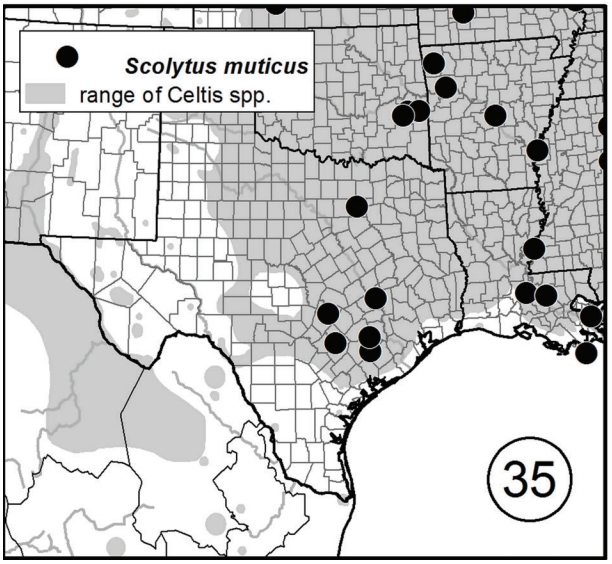

Carphobius arizonicus
range of Juniperus deppeana
30

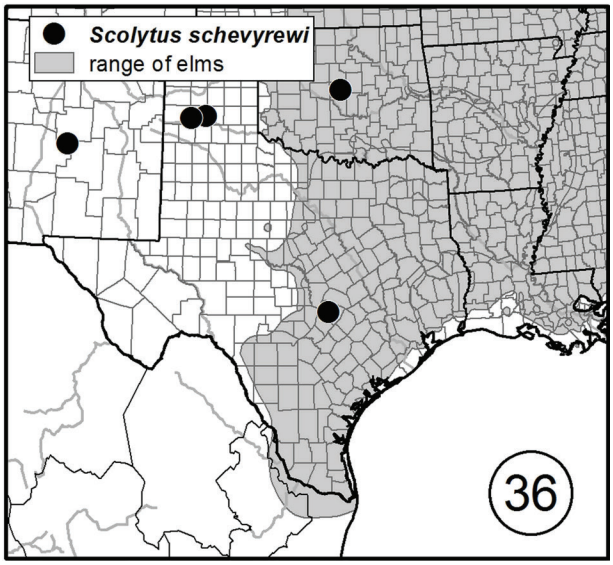

Carphoborus bicornus
C. convexifrons
range of pines
31

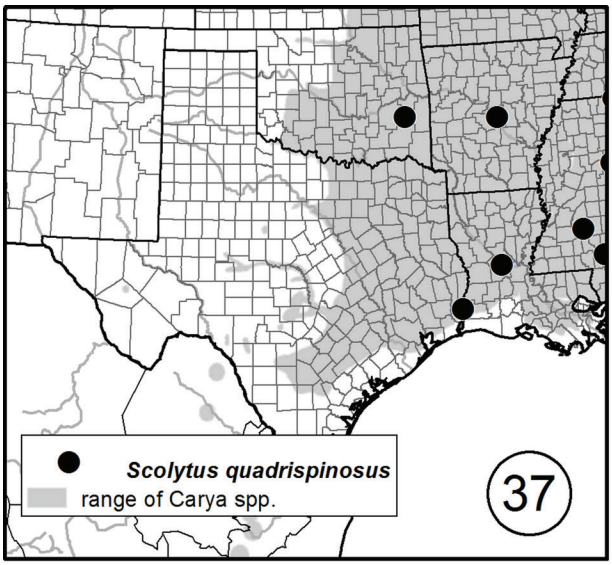

Carphoborus bifurcus
range of pines
32

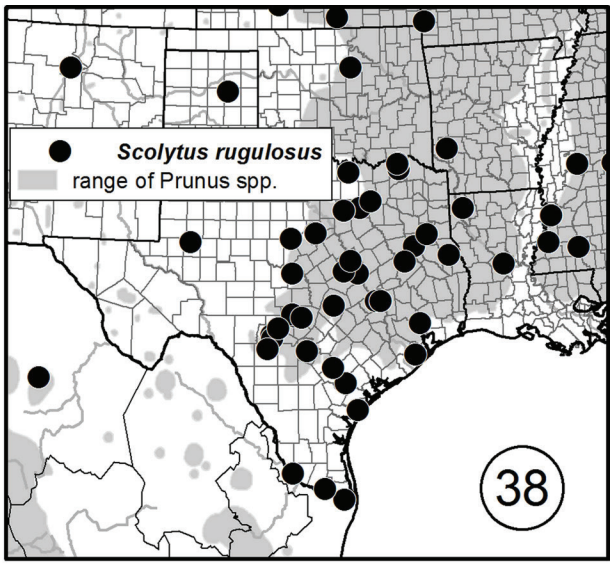

Scolytus fagi
33

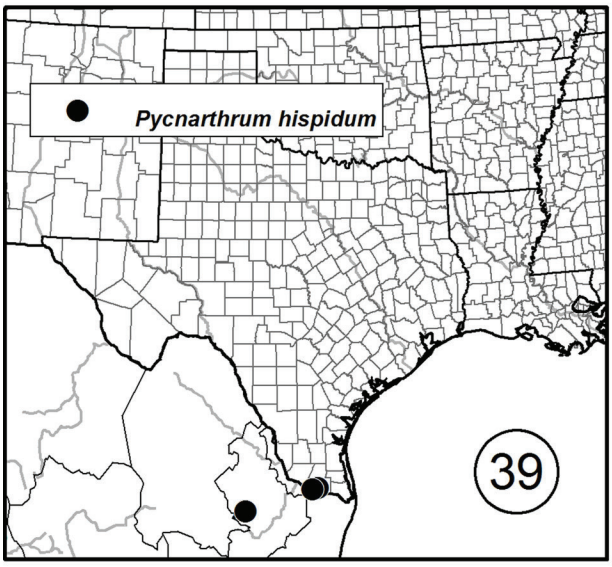

Scolytus multistriatus
range of elms
34

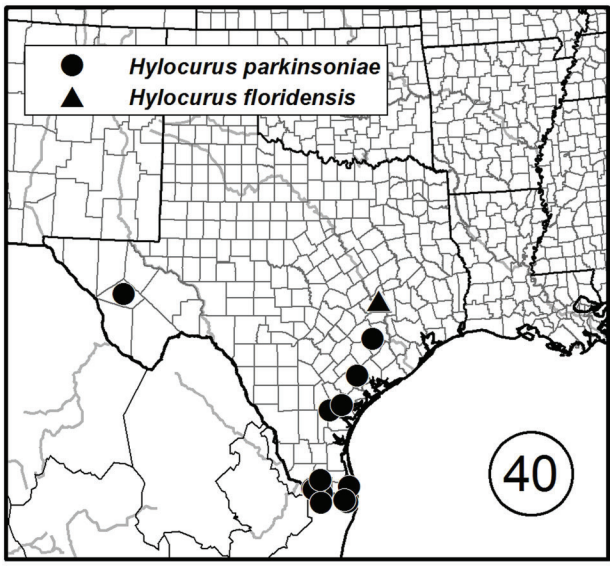

Scolytus muticus
range of Celtis spp.
35

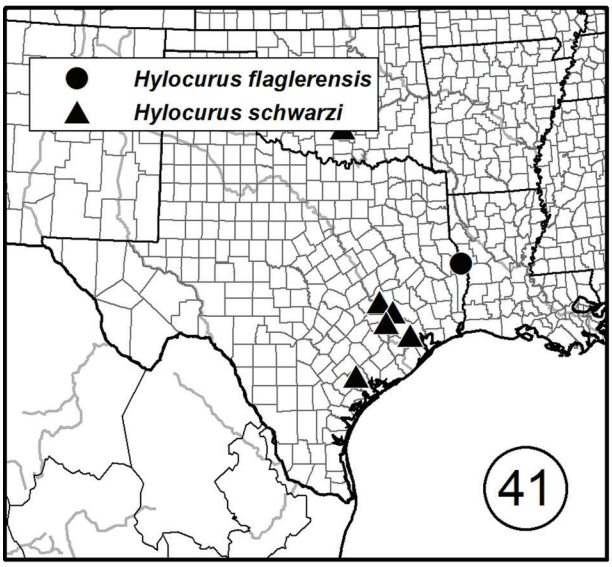

Scolytus schevyrewi
range of elms
36

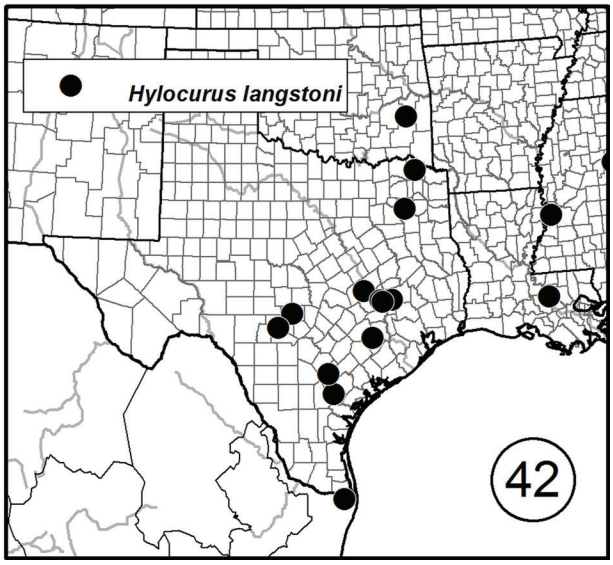

Scolytus quadrispinosus
range of Carya spp.
37

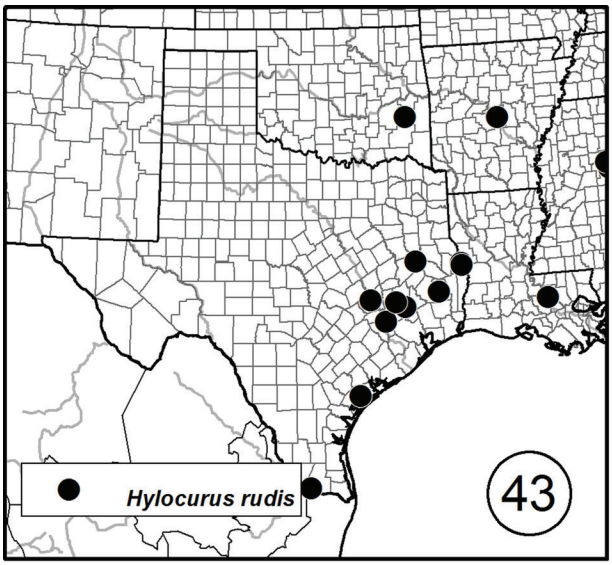

Scolytus rugulosus
range of Prunus spp.
38

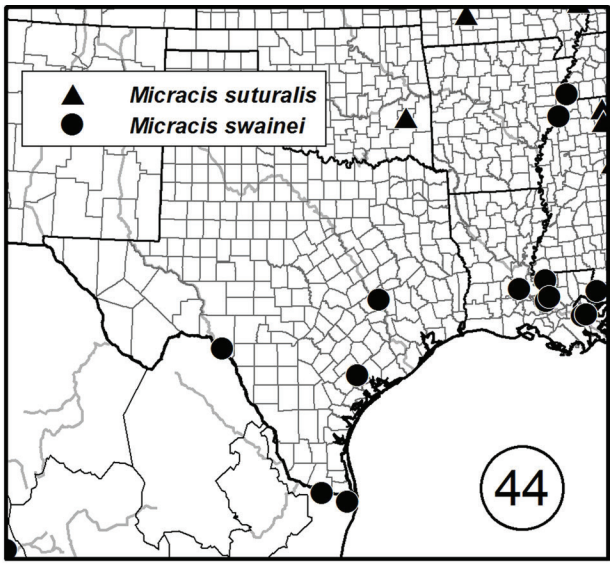

Pycnarthrum hispidum
39

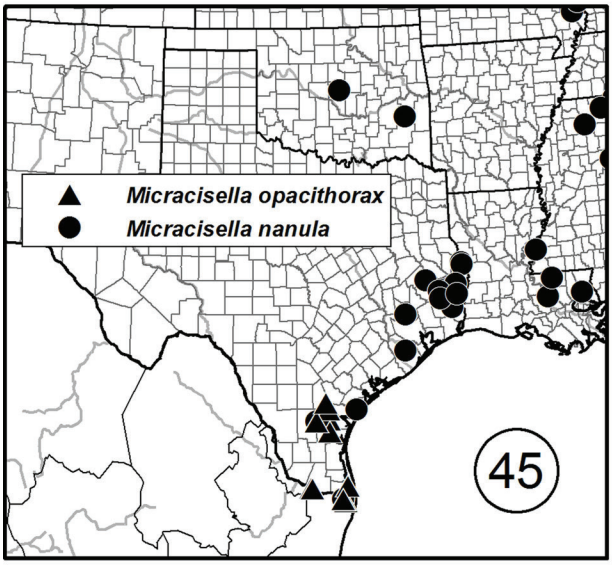

Hylocurus parkinsoniae
Hylocurus floridensis
40

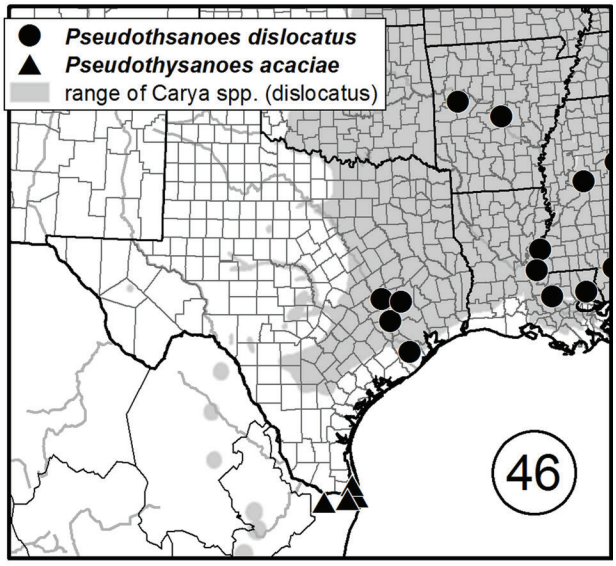

Hylocurus flaglerensis
Hylocurus schwarzi
41

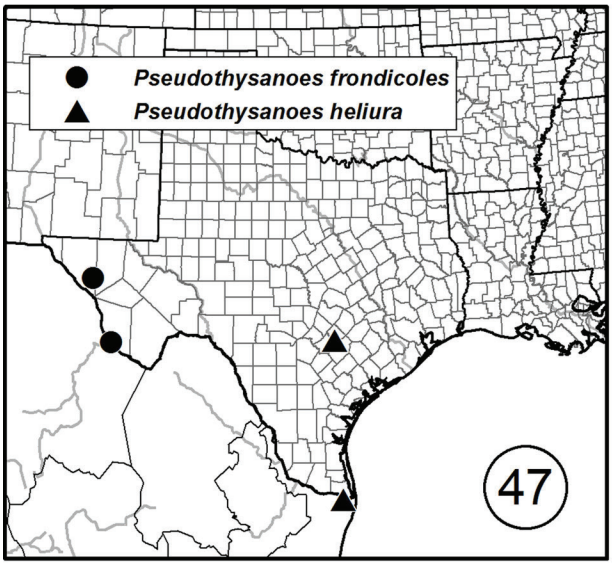

Hylocurus langstoni
42

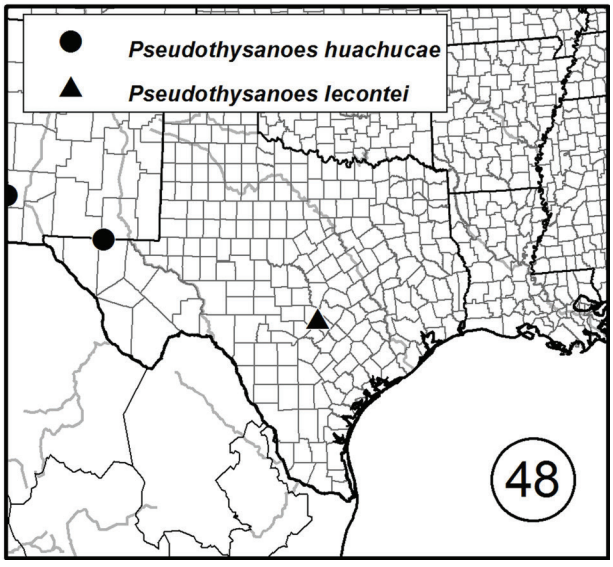

Hylocurus rudis
43

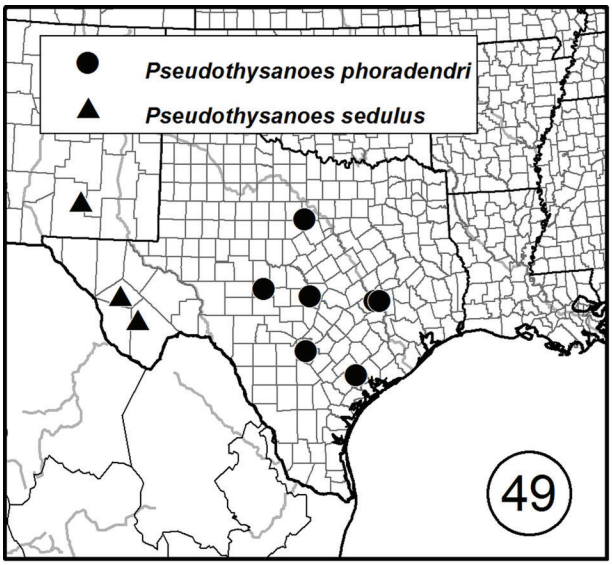

Micracis suturalis
Micracis swainei
44

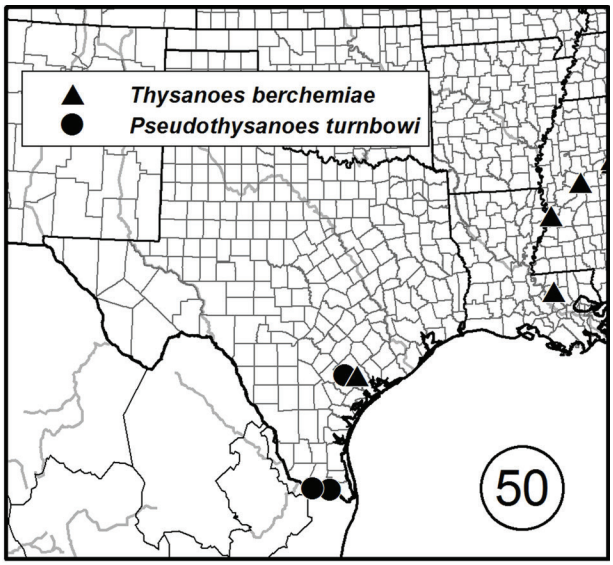

Micracisella opacithorax
Micracisella nanula
45

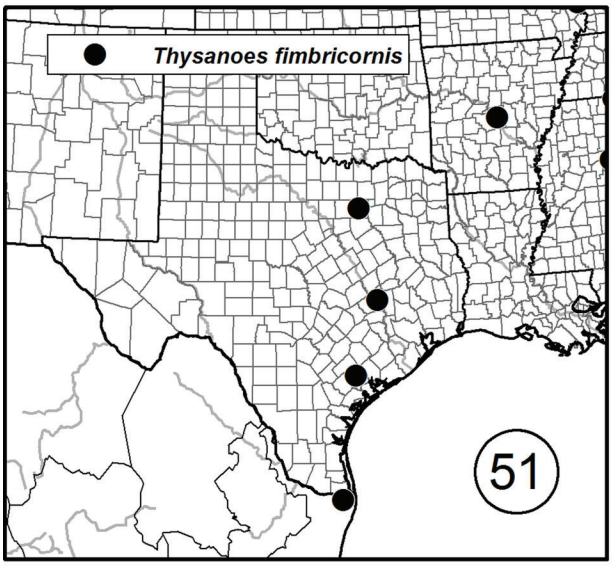

Pseudothsanoes dislocatus
Pseudothysanoes acaciae
range of Carya spp. (dislocatus)
46

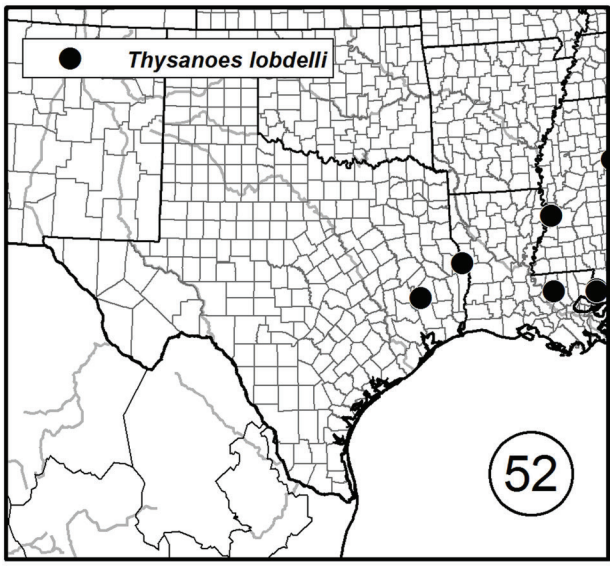

Pseudothysanoes frondicoles
Pseudothysanoes heliura
47

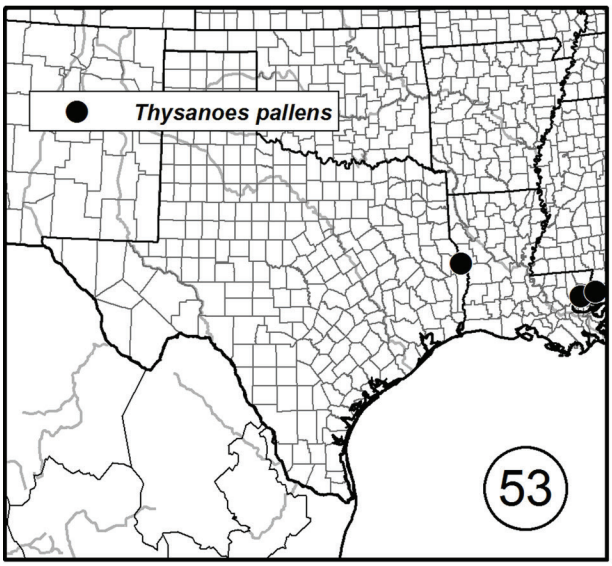

Pseudothysanoes huachucae
Pseudothysanoes lecontei
48

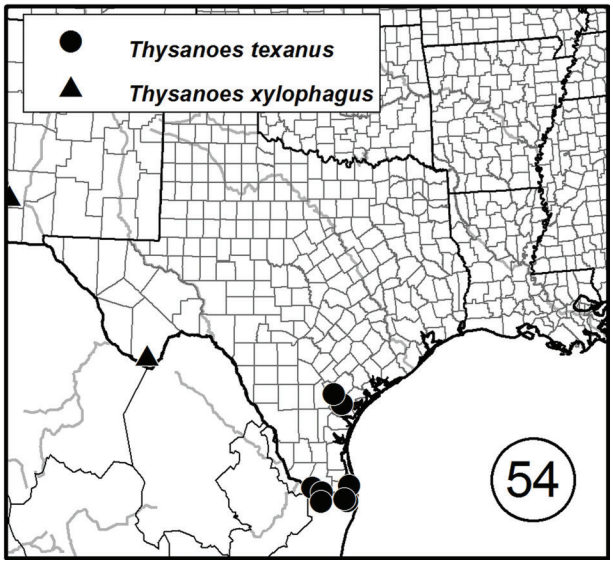

Pseudothysanoes phoradendri
Pseudothysanoes sedulus
49

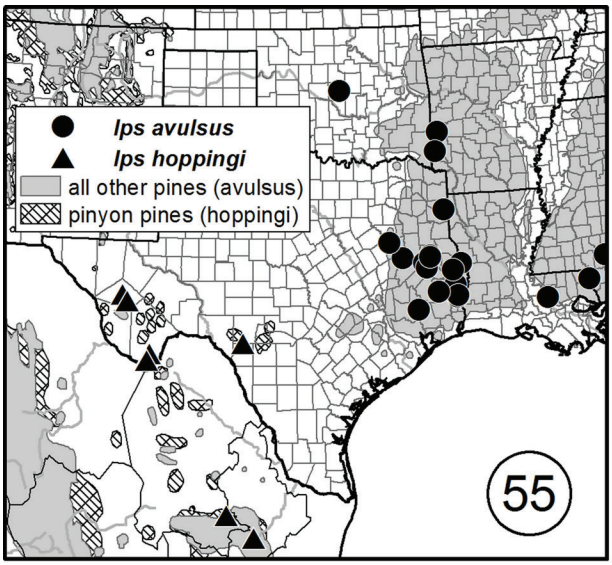

Thysanoes berchemiae
Pseudothysanoes turnbowi
50

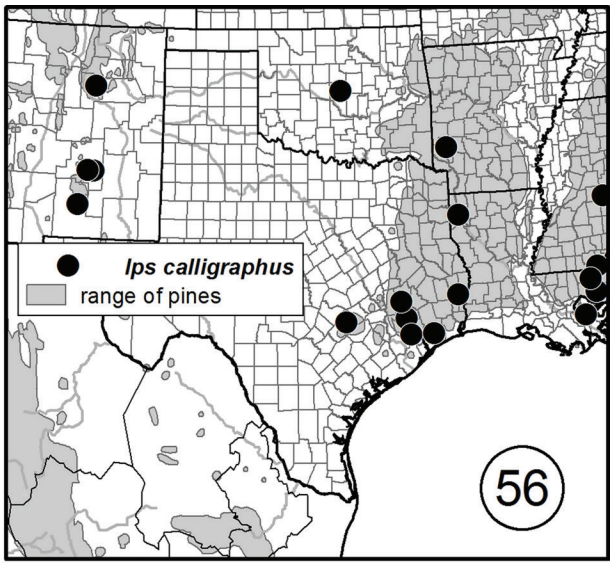

Thysanoes fimbricornis
51

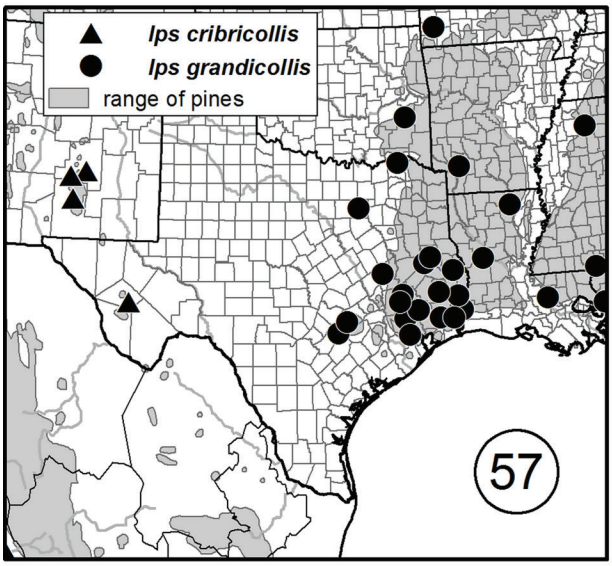

Thysanoes lobdelli
52

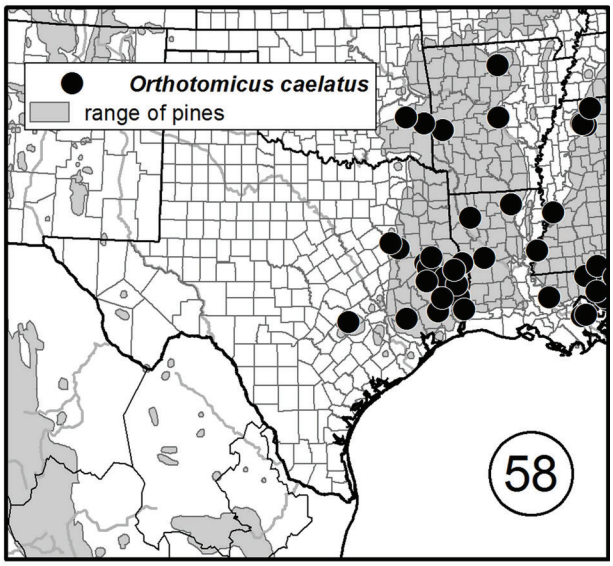

Thysanoes pallens
53

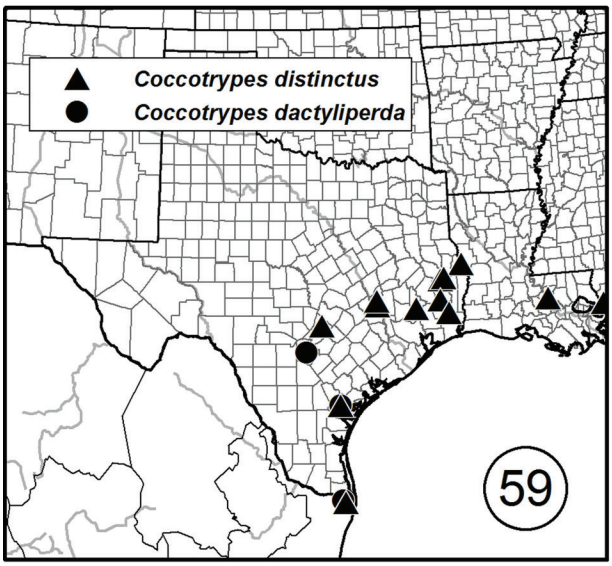

Thysanoes texanus
Thysanoes xylophagus
54

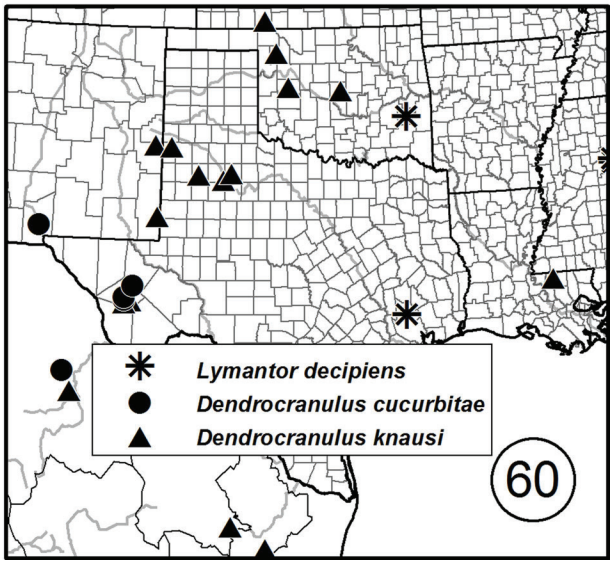

Ips avulsus
Ips hoppingi
all other pines (avulsus)
pinyon pines (hoppingi)
55

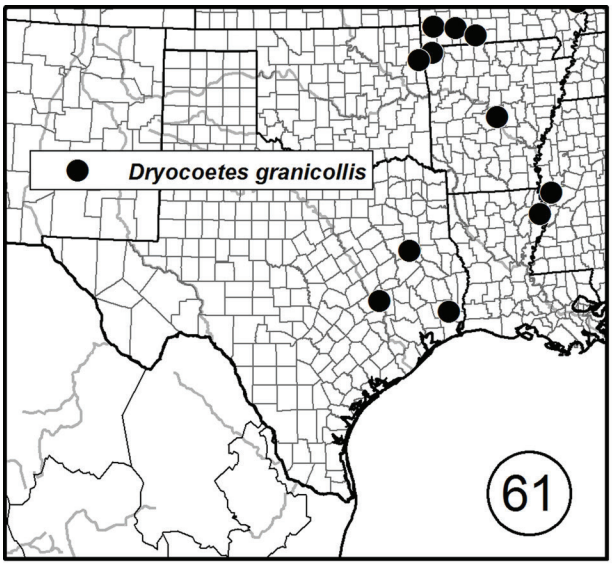

Ips calligraphus
range of pines
56

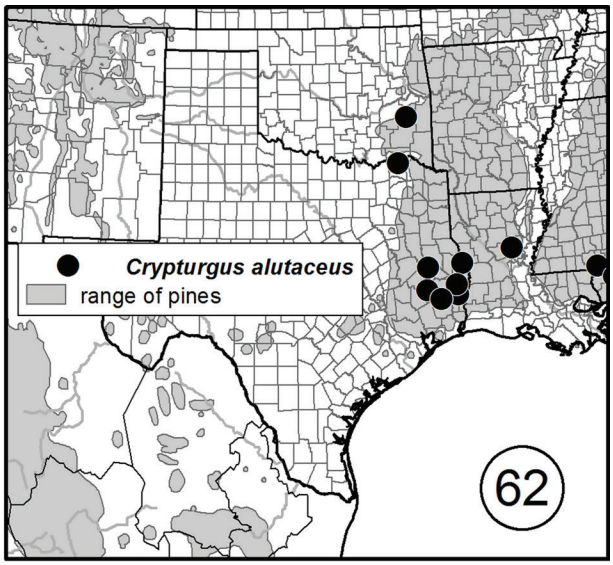

Ips cribricollis
Ips grandicollis
range of pines
57

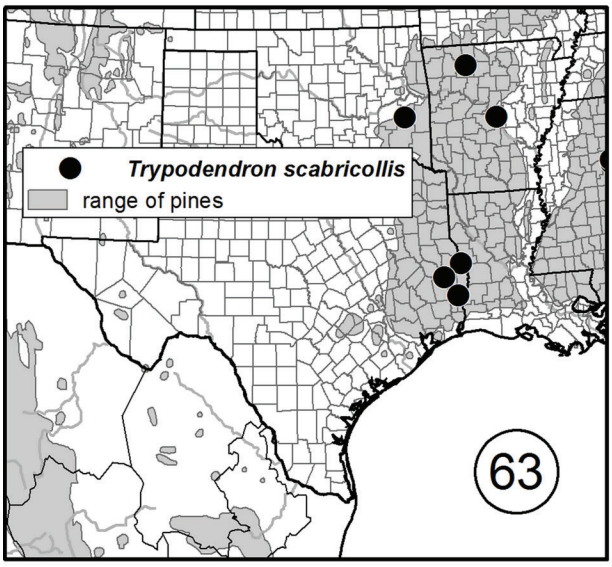

Orthotomicus caelatus
range of pines
58

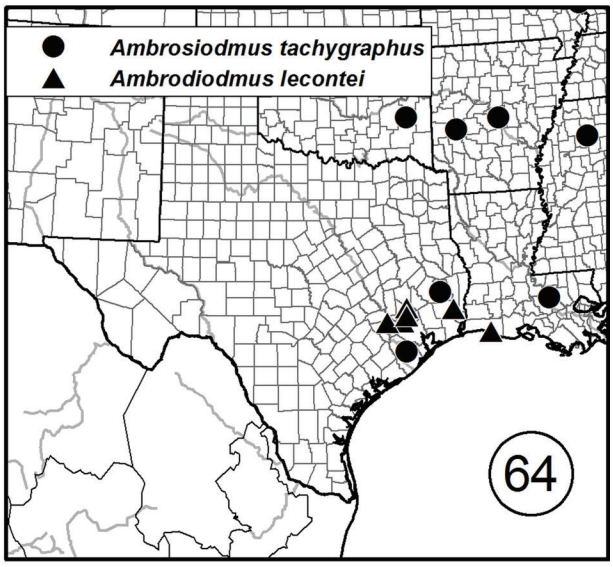

Coccotrypes distinctus
Coccotrypes dactyliperda
59

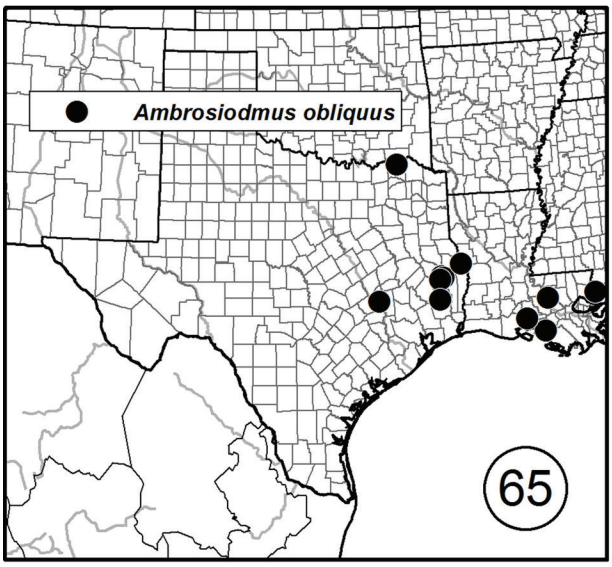

Lymantor decipiens
Dendrocranulus cucurbitae
Dendrocranulus knausi
60

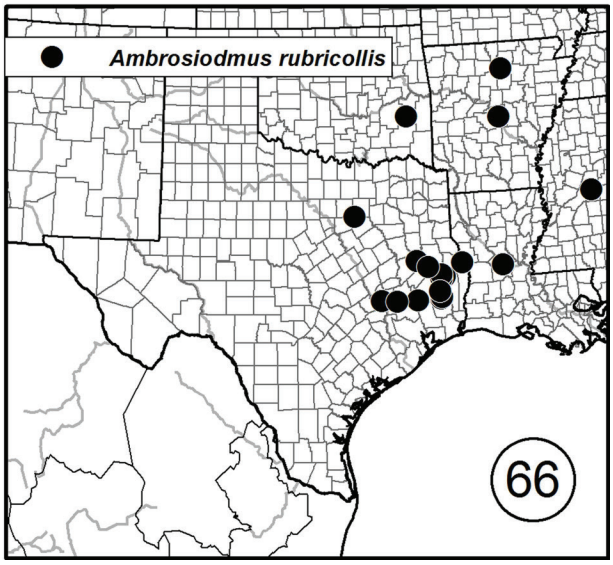

Dryocoetes granicollis
61

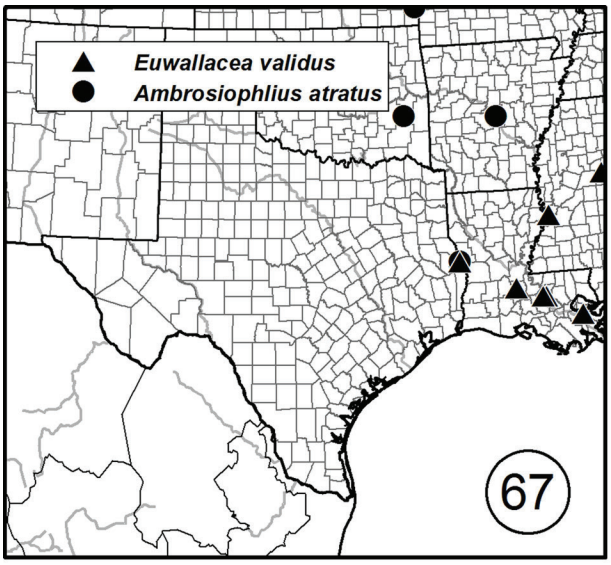

Crypturgus alutaceus
range of pines
62

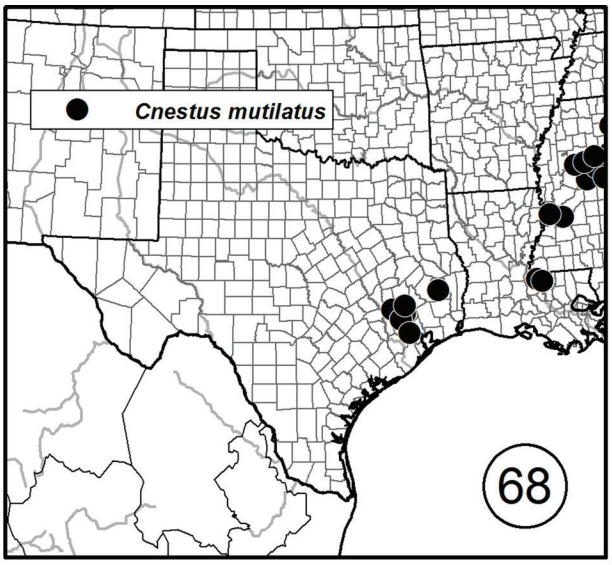

Trypodendron scabricollis
range of pines
63

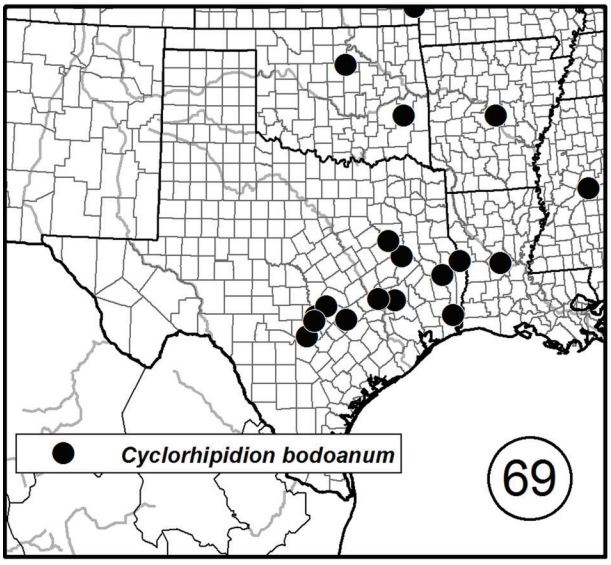

Ambrosiodmus tachygraphus
Ambrodiodmus lecontei
64

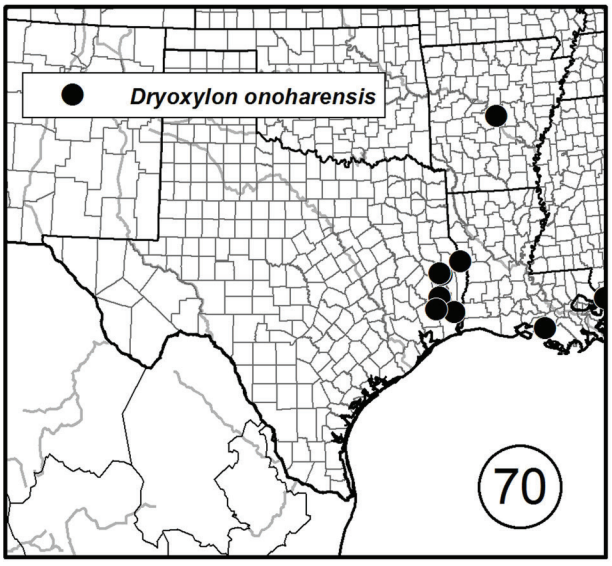

Ambrosiodmus obliquus
65

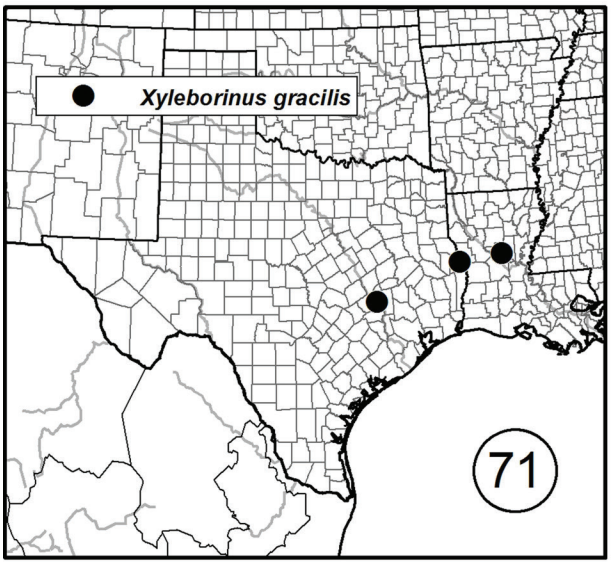

Ambrosiodmus rubricollis
66

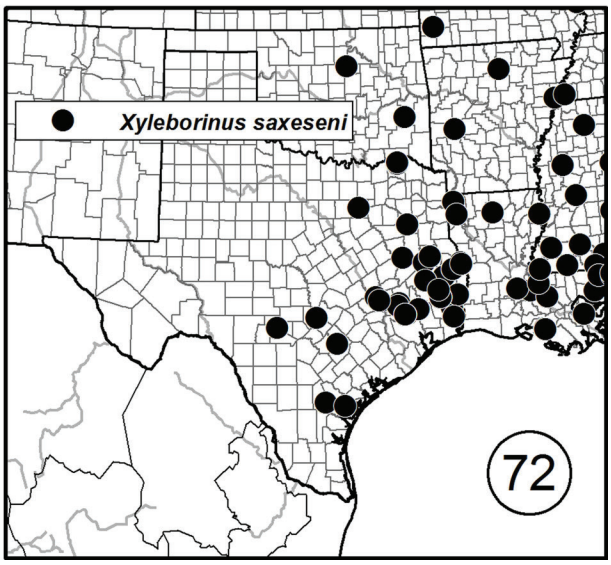

Euwallacea validus
Ambrosiophlius atratus
67

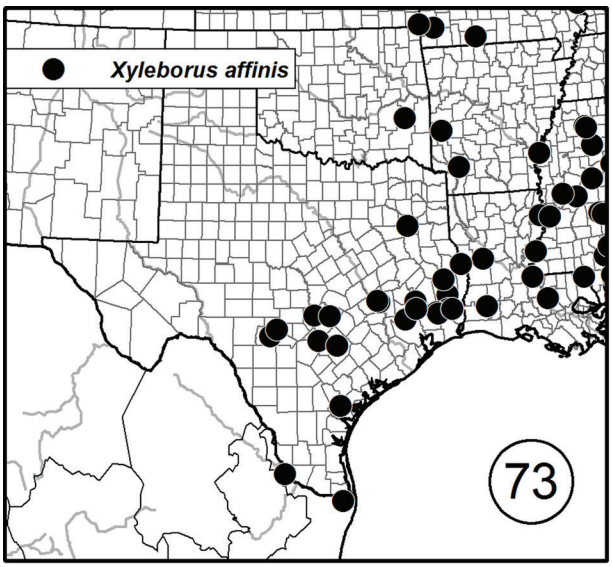

Cnestus mutilatus
68

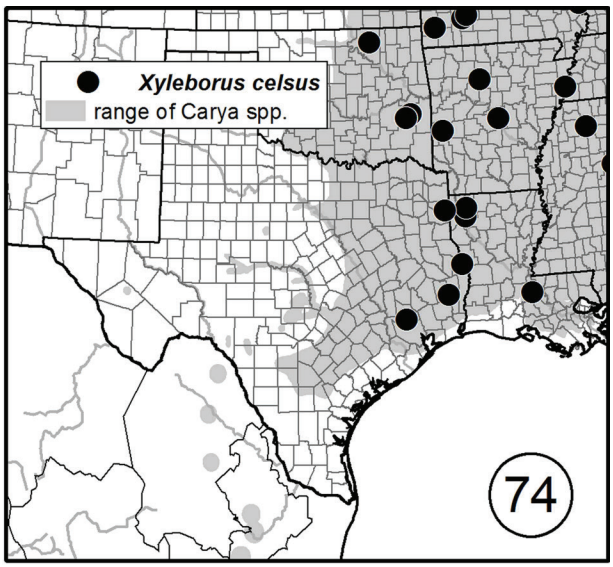

Cyclorhipidion bodoanum
69

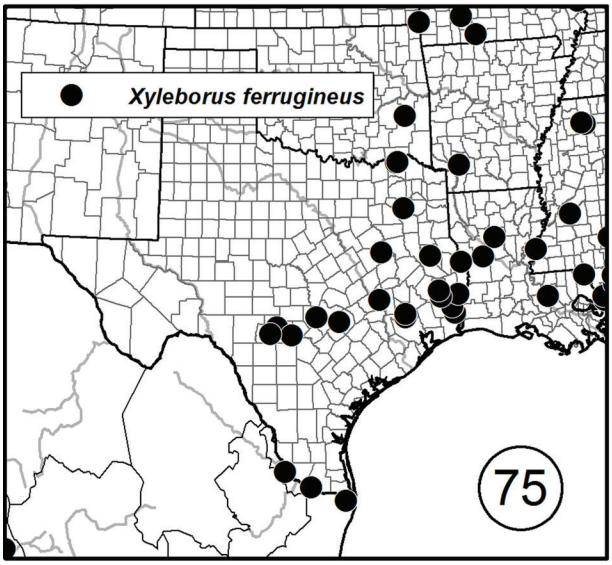

Dryoxylon onoharensis
70

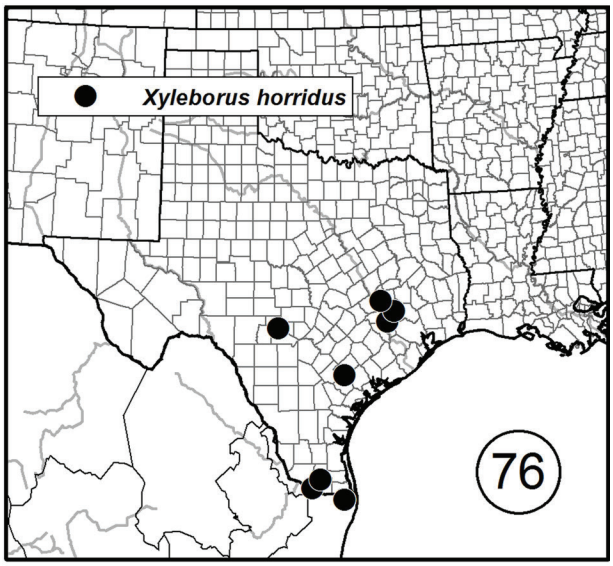

Xyleborinus gracilis
71

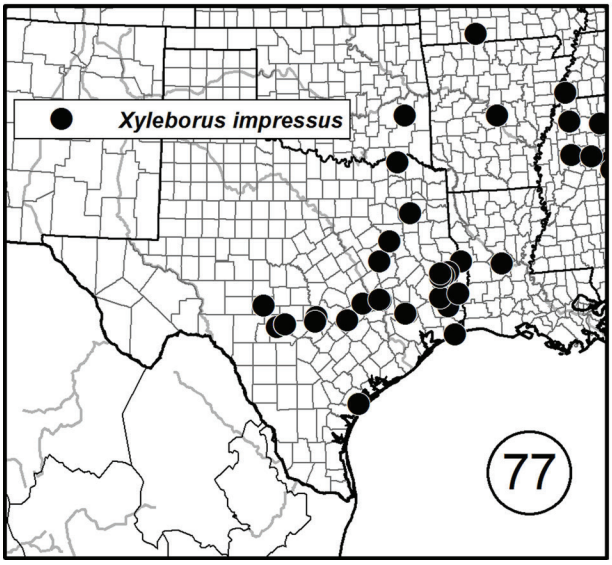

Xyleborinus saxeseni
72

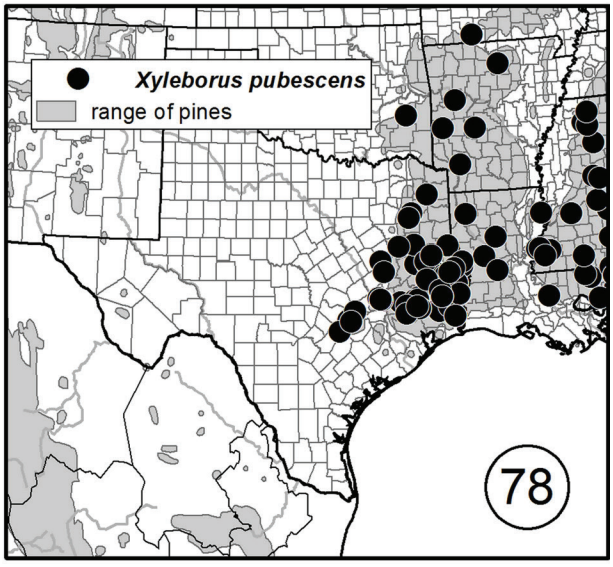

Xyleborus affinis
73

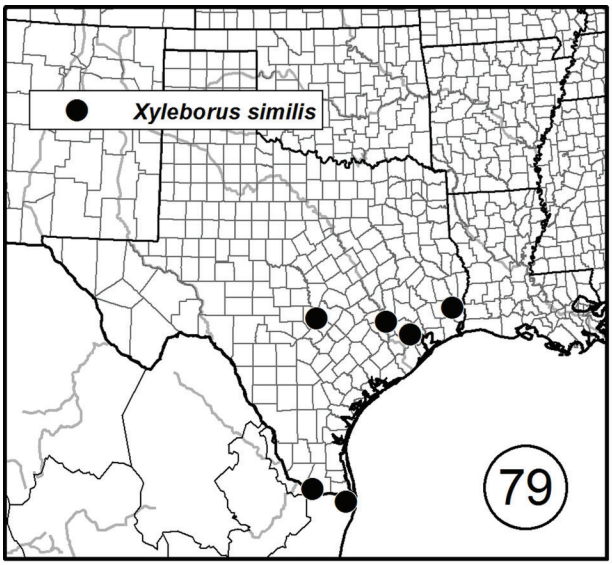

Xyleborus celsus
range of Carya spp.
74

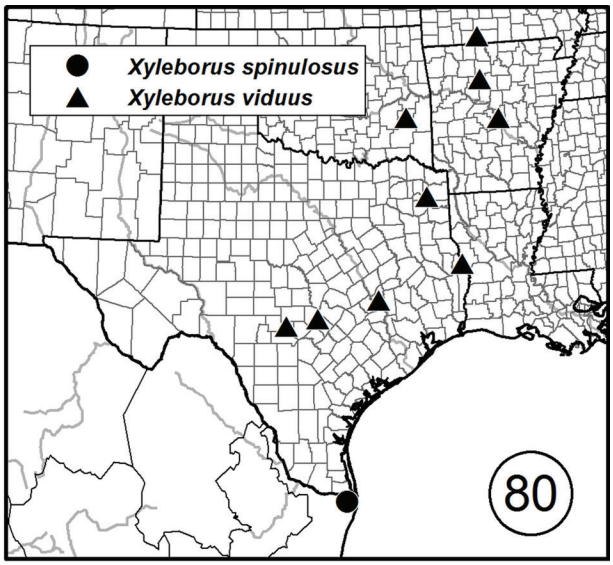

Xyleborus ferrugineus
75

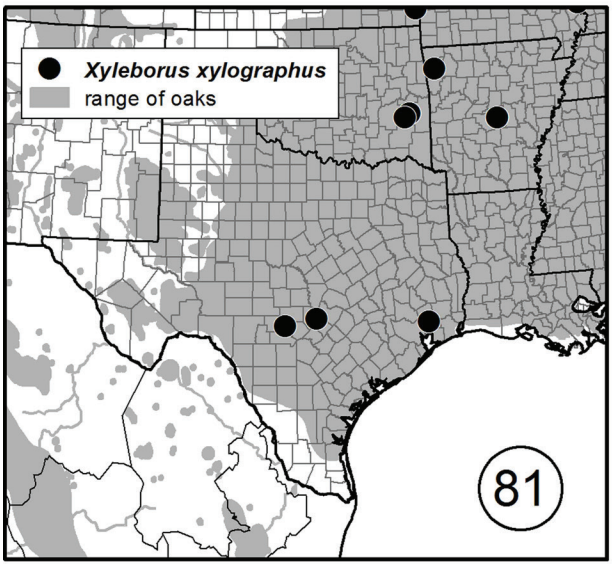

Xyleborus horridus
76

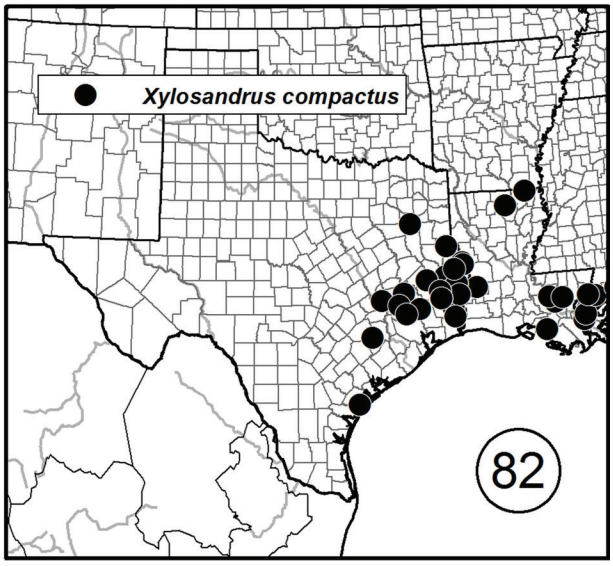

Xyleborus impressus
77

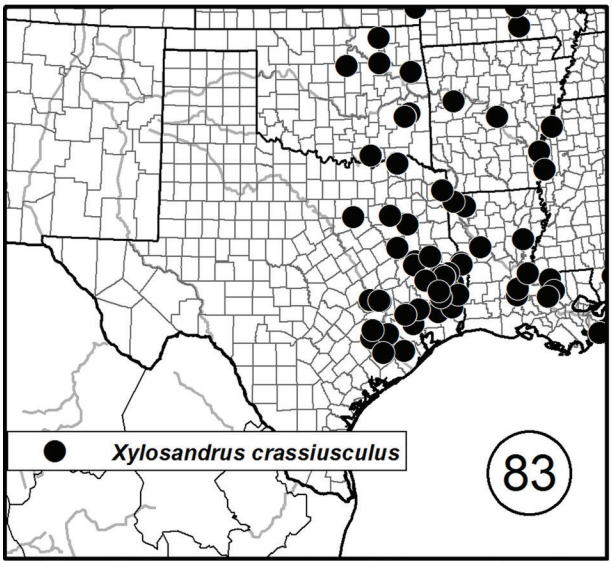

Xyleborus pubescens
range of pines
78

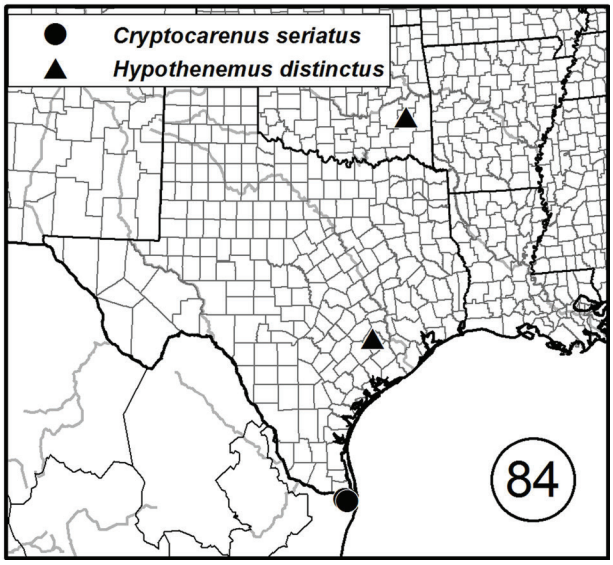

Xyleborus similis
79

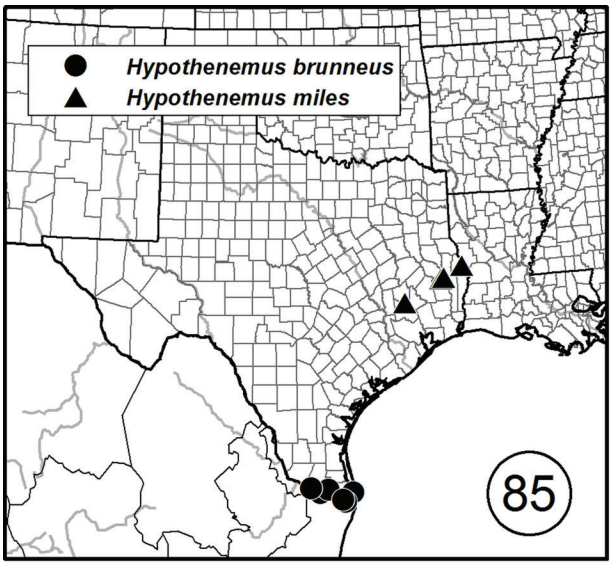

Xyleborus spinulosus
Xyleborus viduus
80

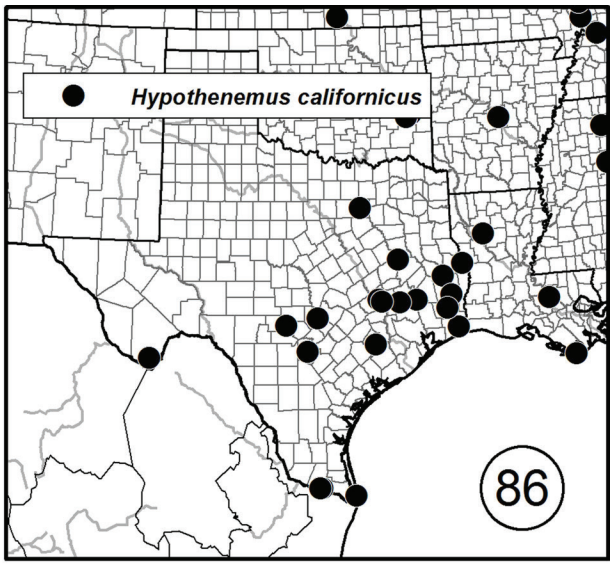

Xyleborus xylographus
range of oaks
81

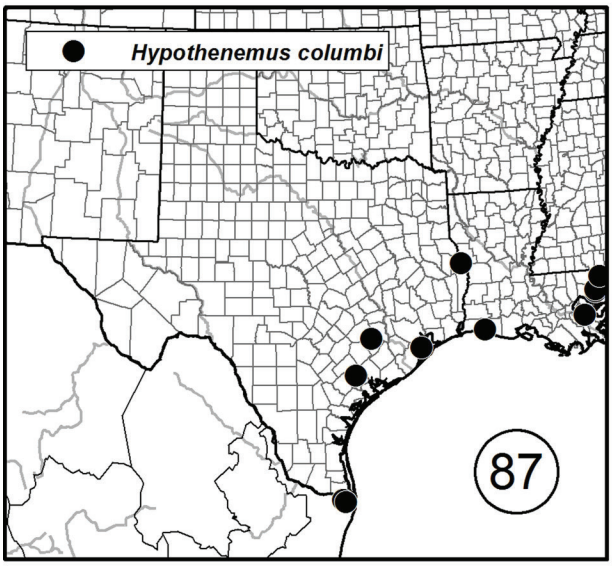

Xylosandrus compactus
82

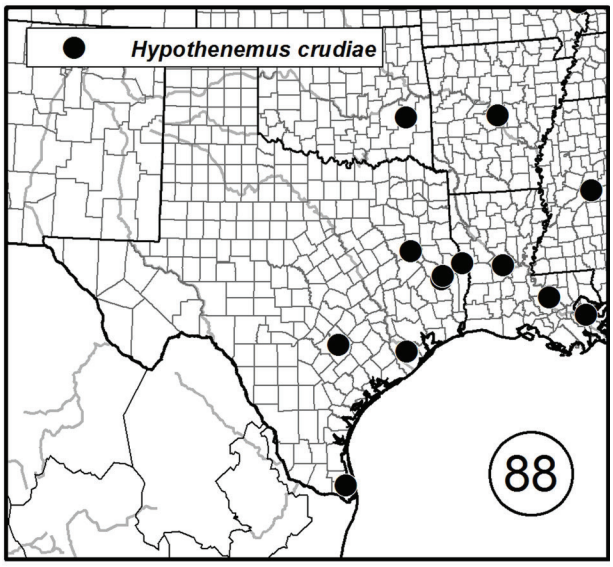

Xylosandrus crassiusculus
83

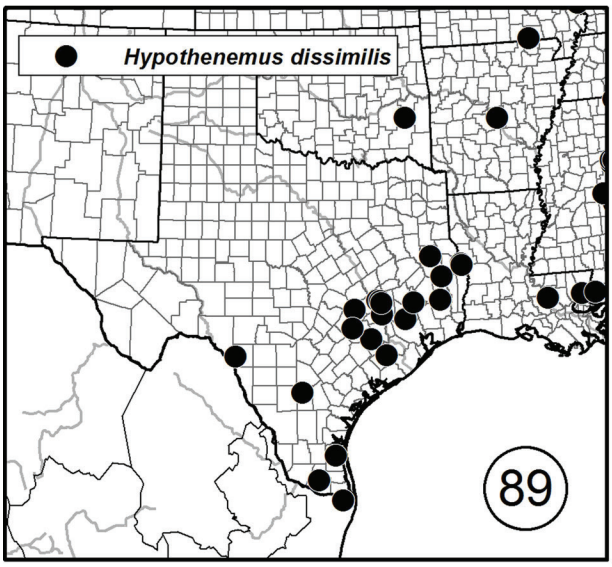

Cryptocarenus seriatus
Hypothenemus distinctus
84

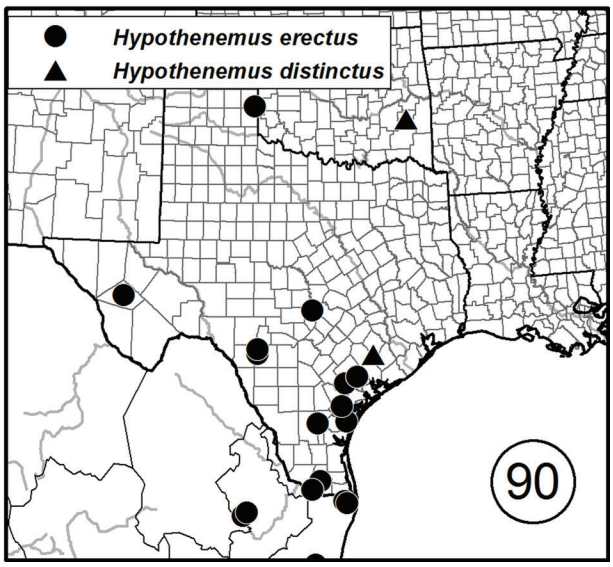

Hypothenemus brunneus
Hypothenemus miles
85

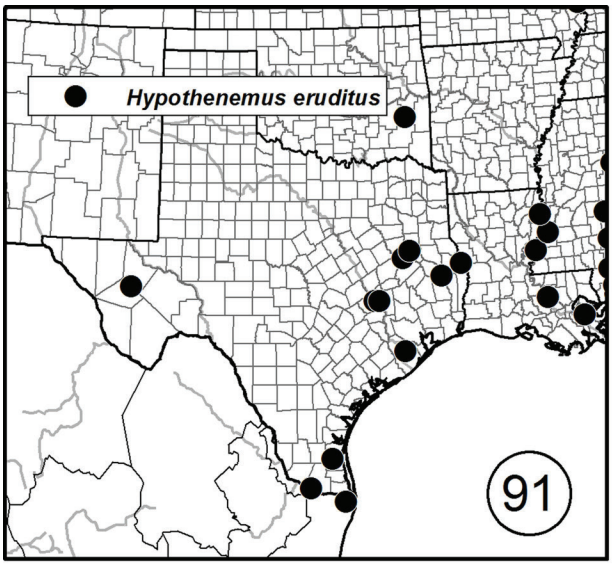

Hypothenemus californicus
86

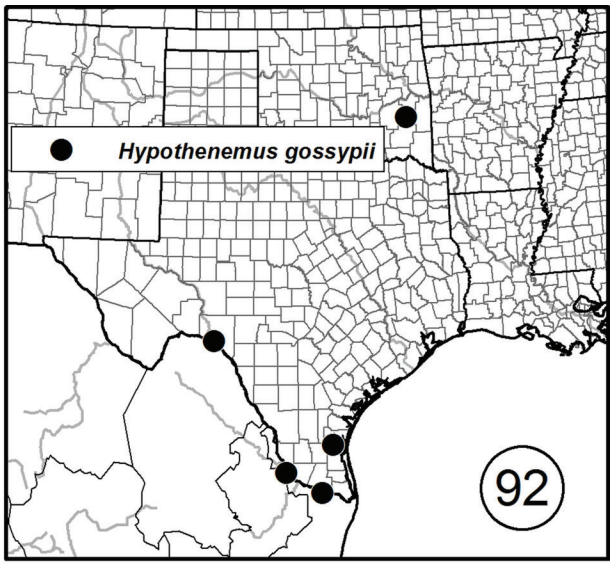

Hypothenemus columbi
87

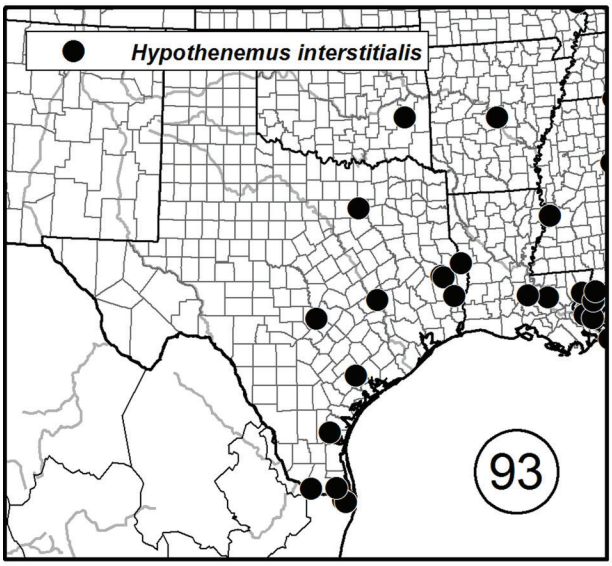

Hypothenemus crudiae
88

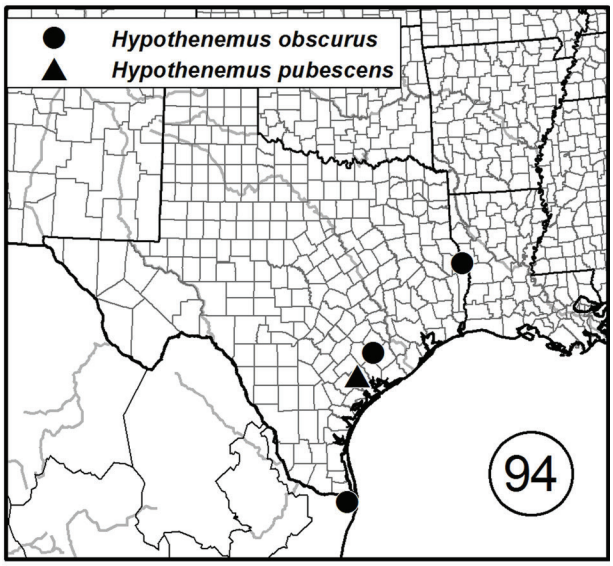

Hypothenemus dissimilis
89

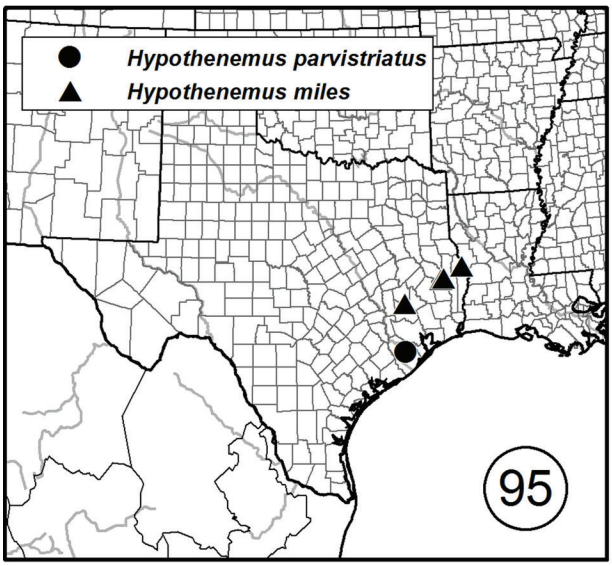

Hypothenemus erectus
Hypothenemus distinctus
90

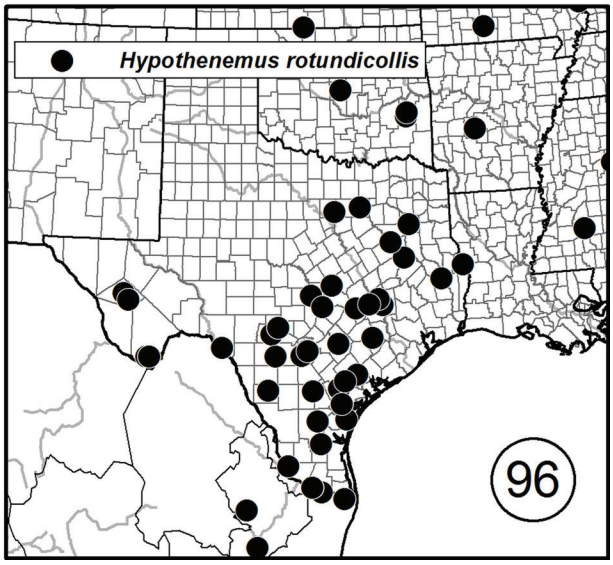

Hypothenemus eruditus
91

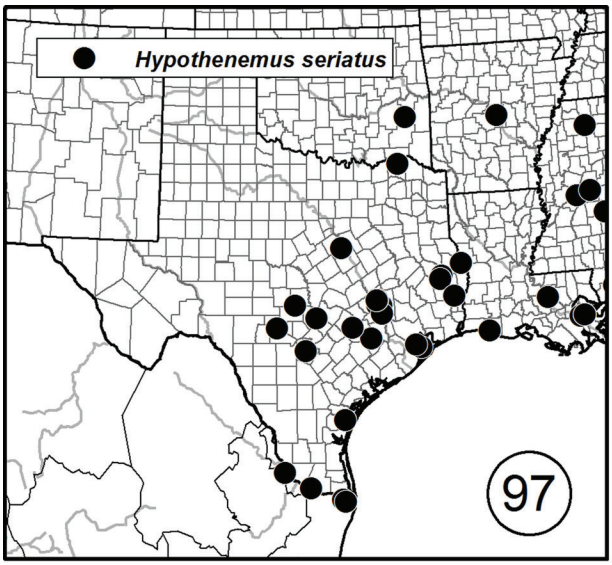

Hypothenemus gossypii
92

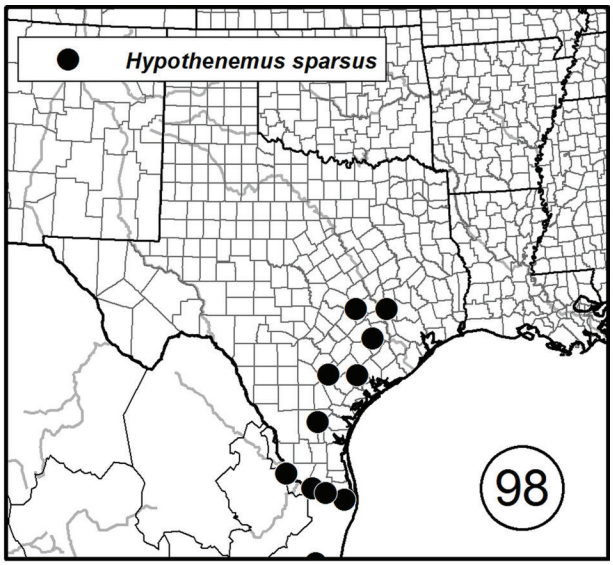

Hypothenemus interstitialis
93

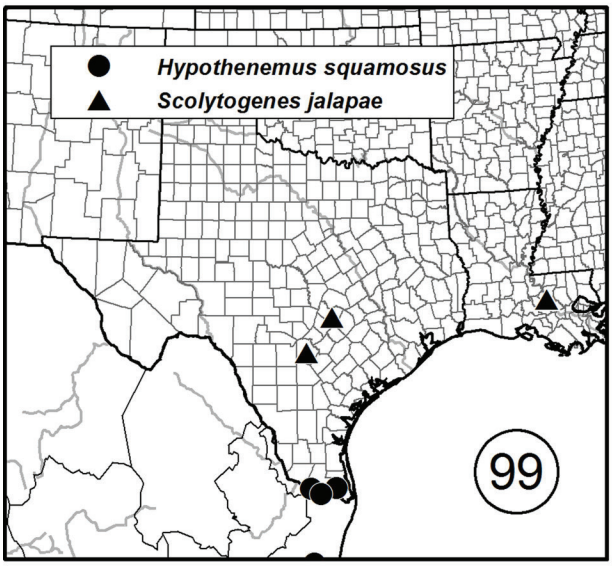

Hypothenemus obscurus
Hypothenemus pubescens
94

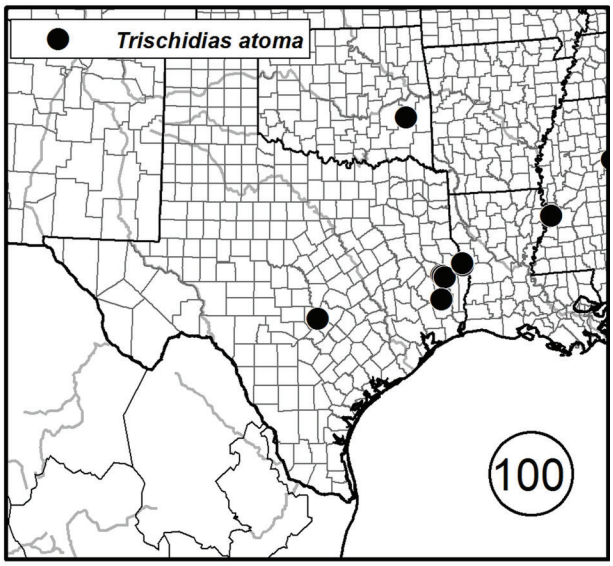

Hypothenemus parvistriatus
Hypothenemus miles
95

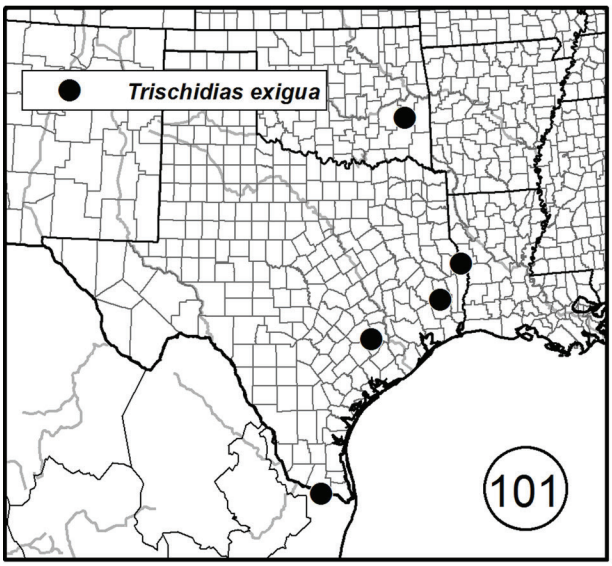

Hypothenemus rotundicollis
96

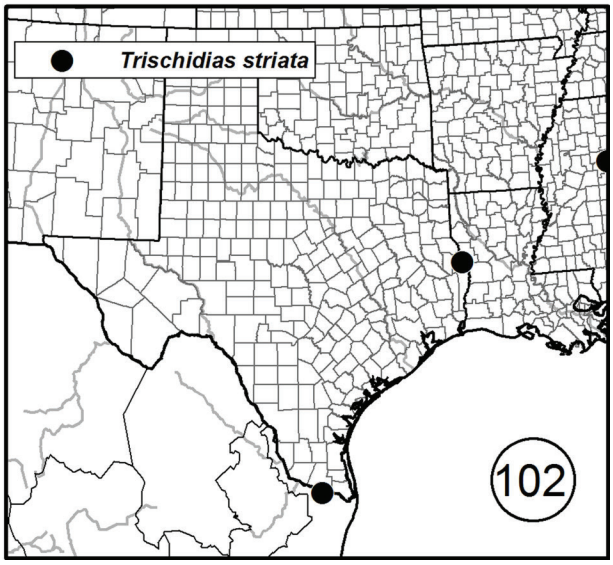

Hypothenemus seriatus
97

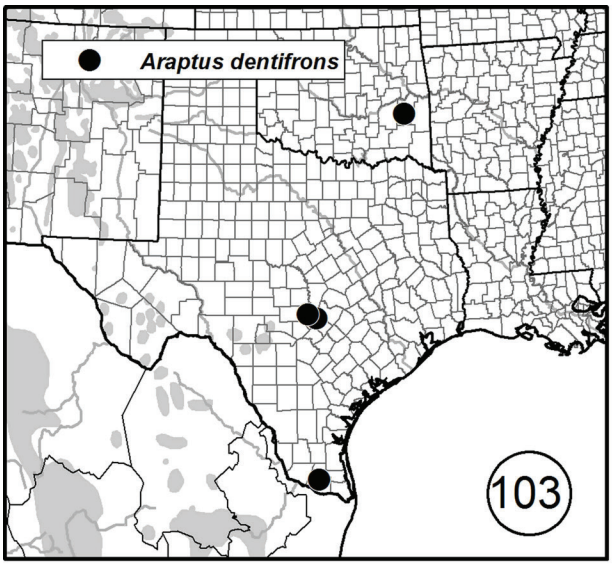

Hypothenemus sparsus
98

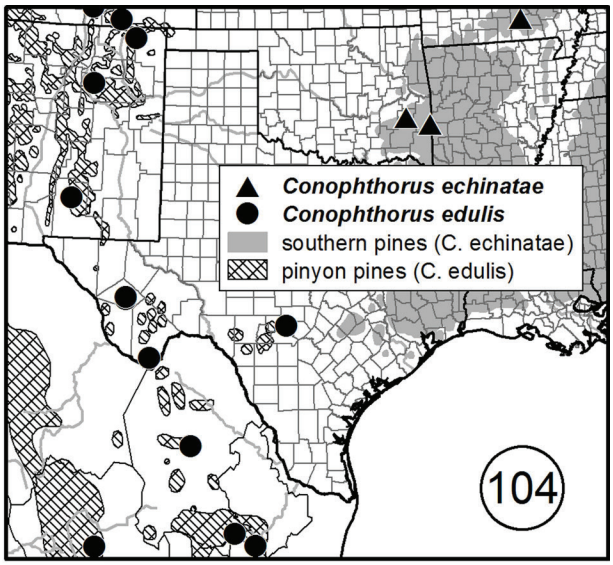

Hypothenemus squamosus
Scolytogenes jalapae
99

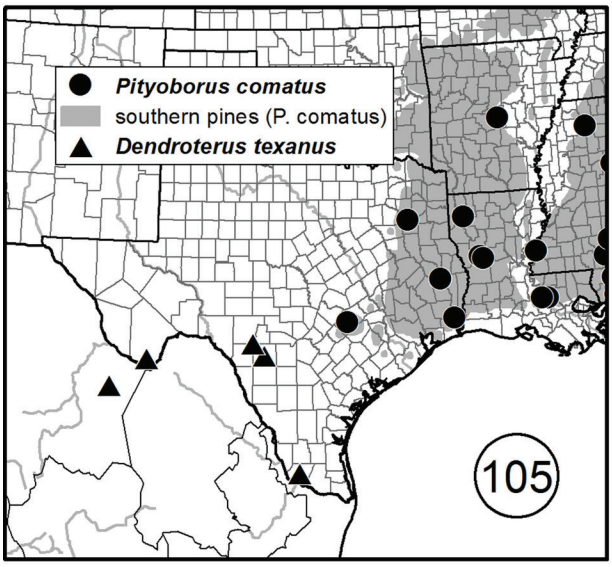

Trischidias atoma
100

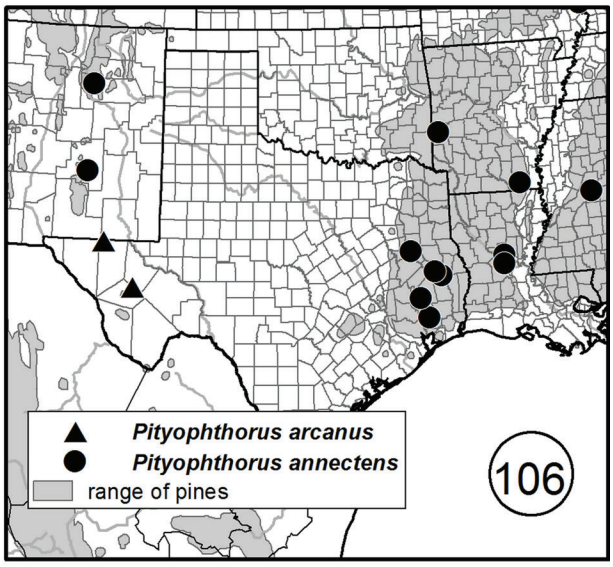

Trischidias exigua
101

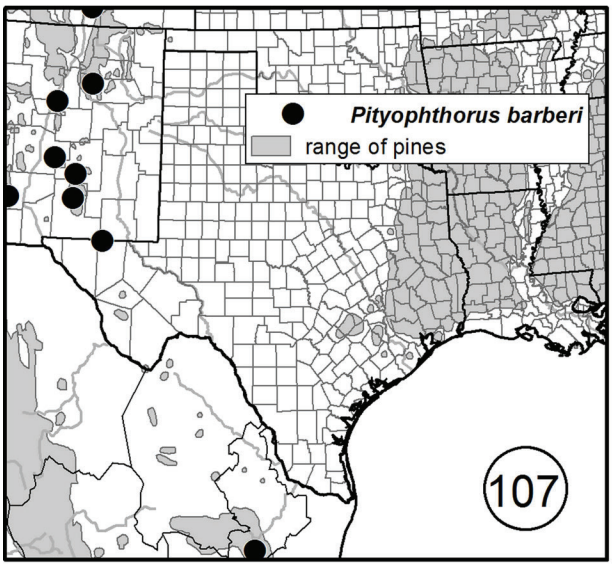

Trischidias striata
102

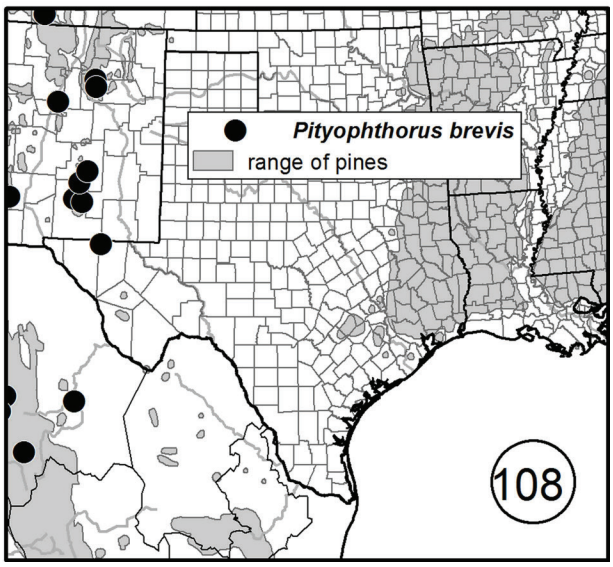

Araptus dentifrons
103

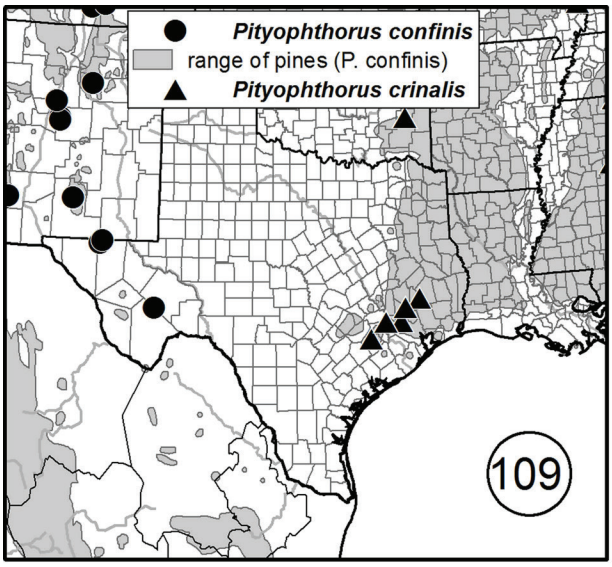

Conophthorus echinatae
Conophthorus edulis
southern pines (C. echinatae)
pinyon pines (C. edulis)
104

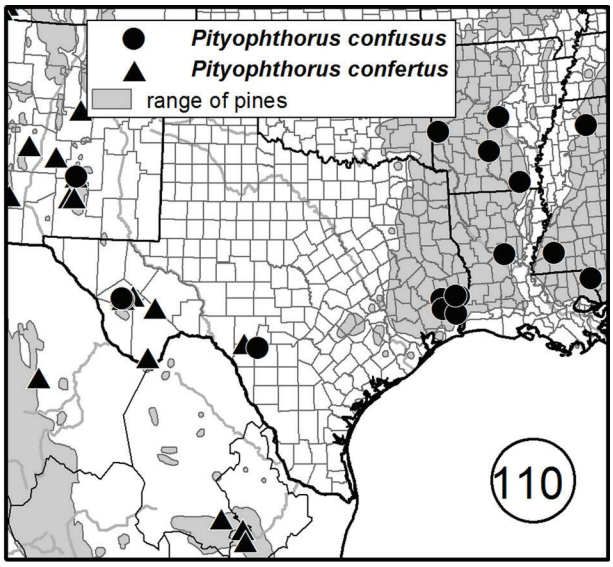

Pityoborus comatus
southern pines (P. comatus)
Dendroterus texanus
105

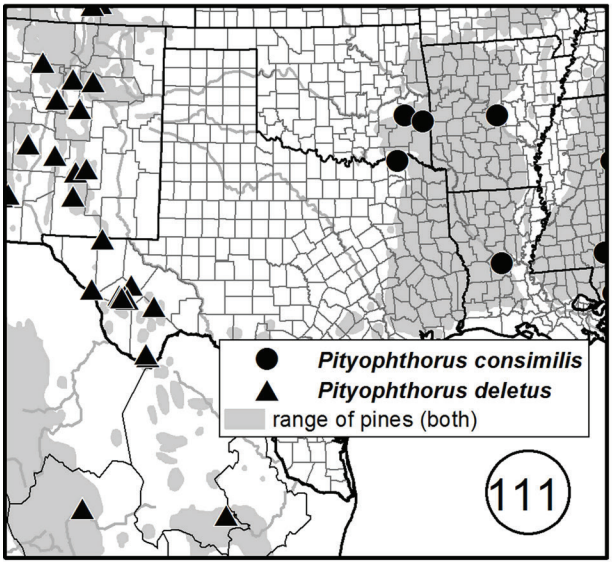

Pityophthorus arcanus
Pityophthorus annectens
range of pines
106

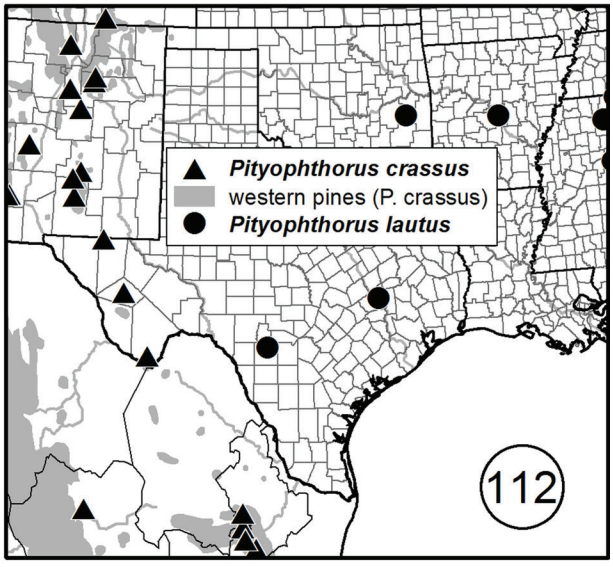

Pityophthorus barberi
range of pines
107

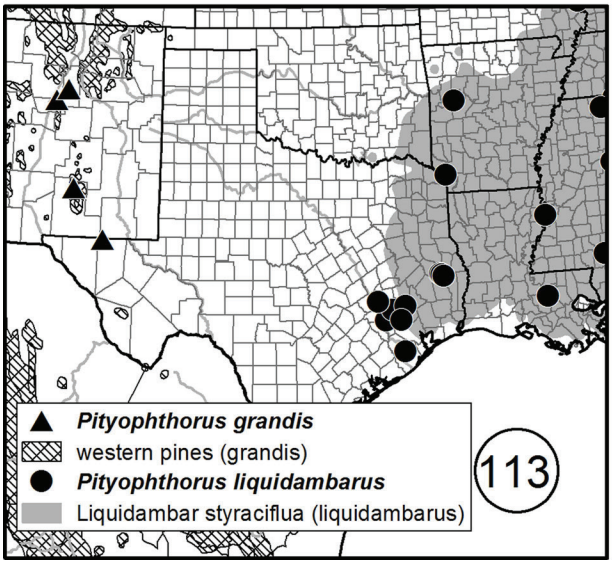

Pityophthorus brevis
range of pines
108

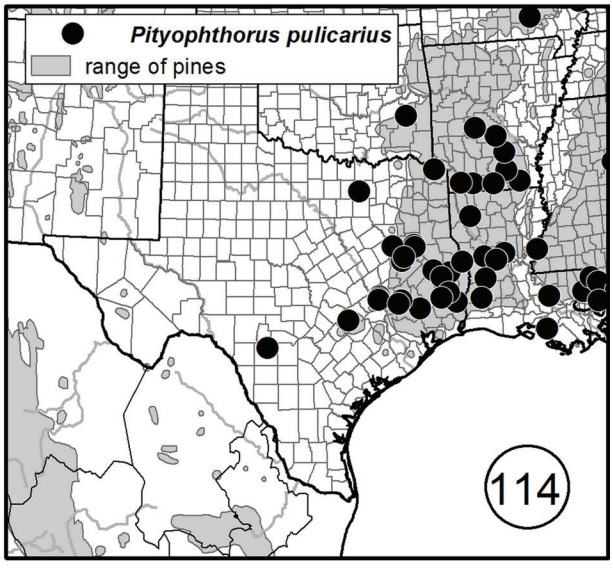

Pityophthorus confinis
range of pines (P. confinis)
Pityophthorus crinalis
109

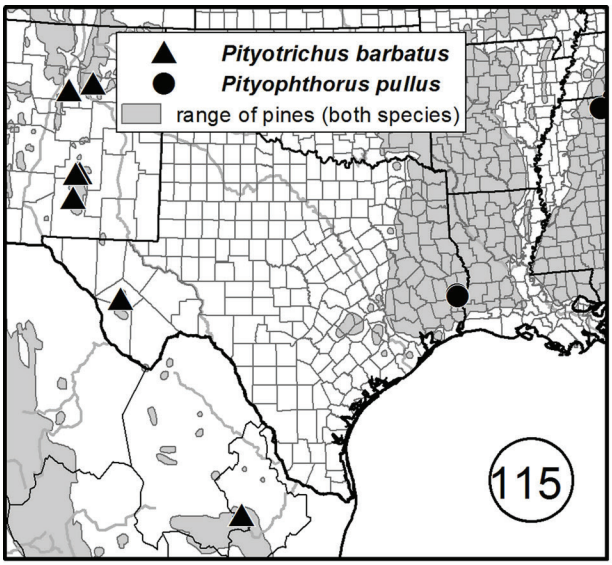

Pityophthorus confusus
Pityophthorus confertus
range of pines
110

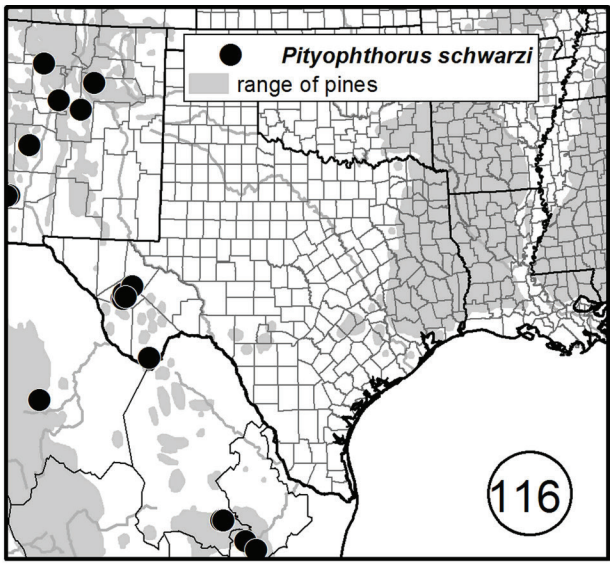

Pityophthorus consimilis
Pityophthorus deletus
range of pines (both)
111

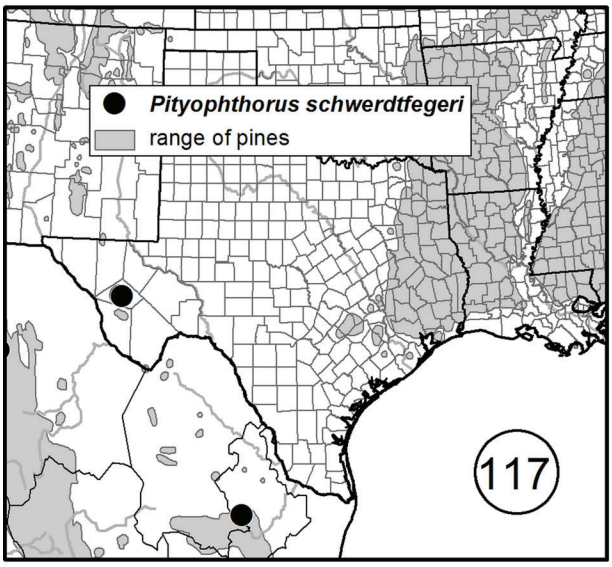

Pityophthorus crassus
western pines (P. crassus)
Pityophthorus lautus
112

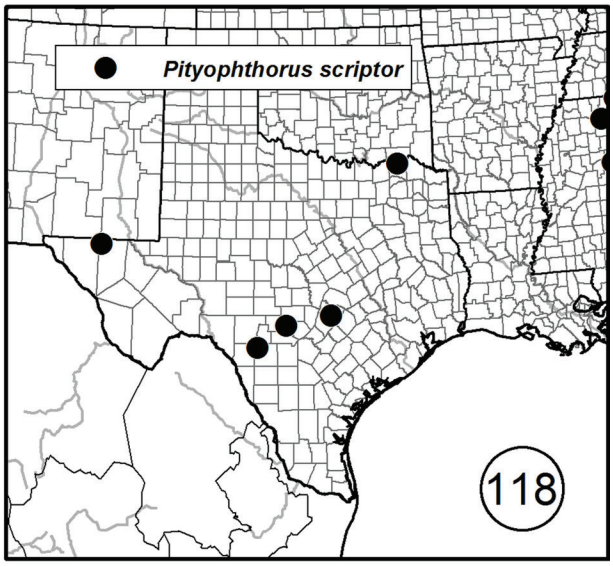

Pityophthorus grandis
western pines (grandis)
Pityophthorus liquidambarus
Liquidambar styraciflua (liquidambarus)
113

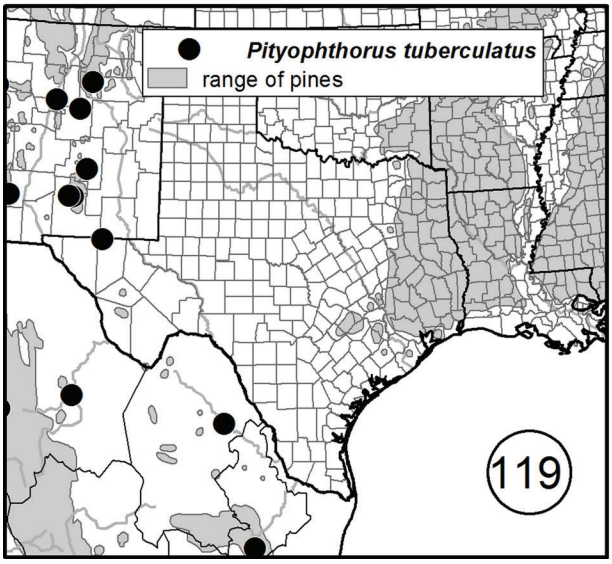

Pityophthorus pulicarius
range of pines
114

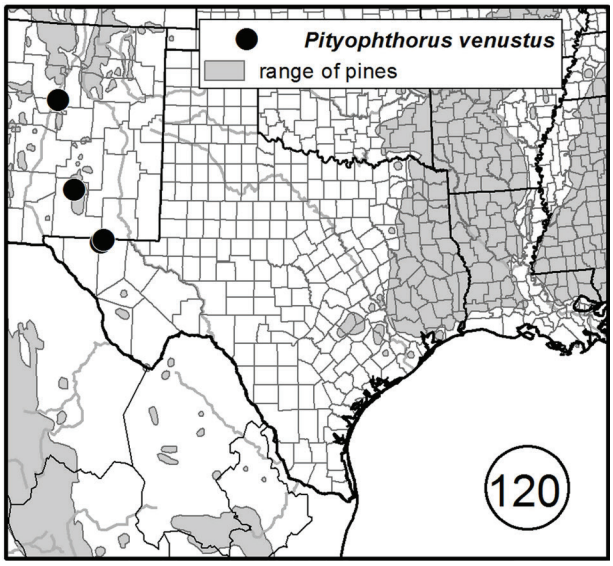

Pityotrichus barbatus
Pityophthorus pullus
range of pines (both species)
115

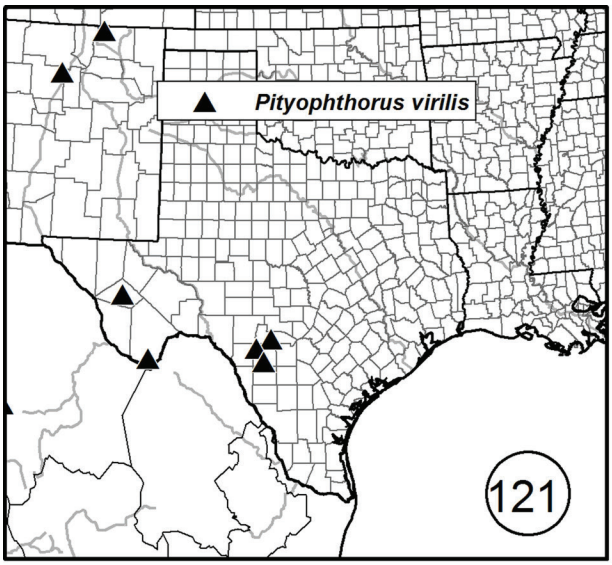

Pityophthorus schwarzi
range of pines
116

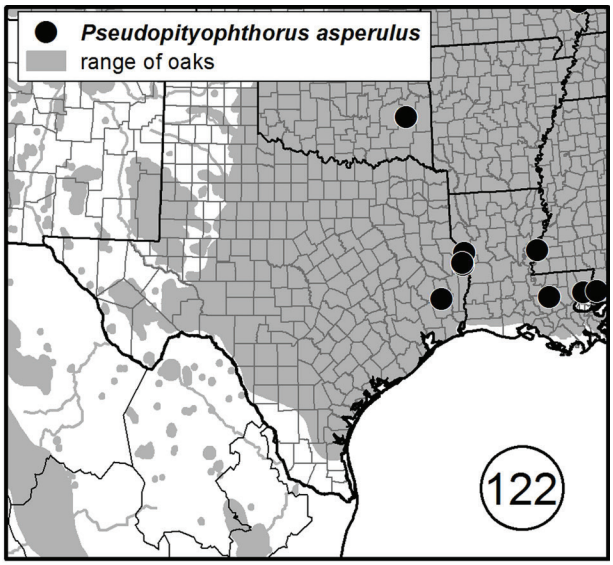

Pityophthorus schwerdtfegeri
range of pines
117

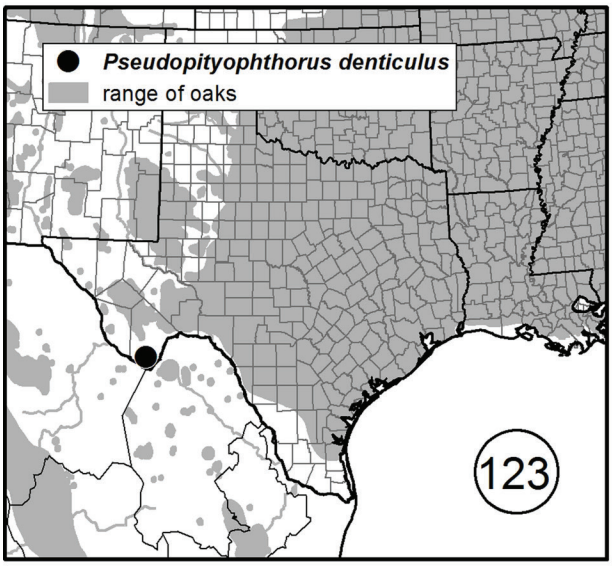

Pityophthorus scriptor
118

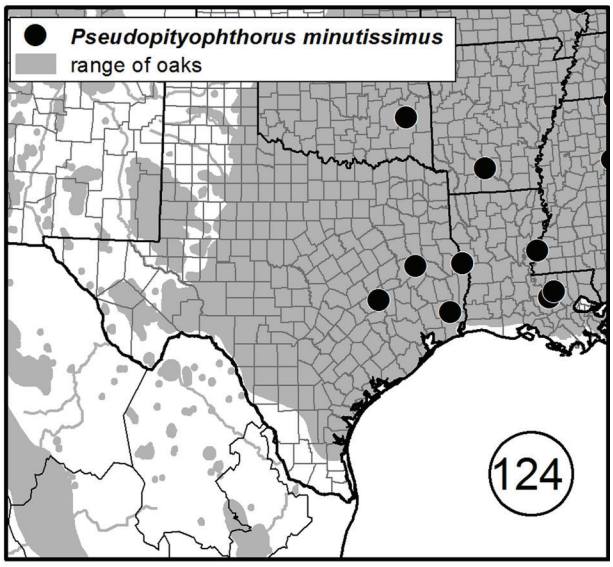

Pityophthorus tuberculatus
range of pines
119

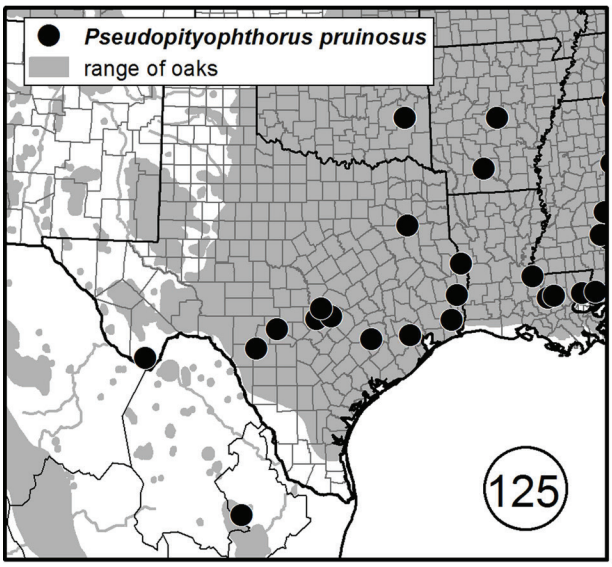

Pityophthorus venustus
range of pines
120

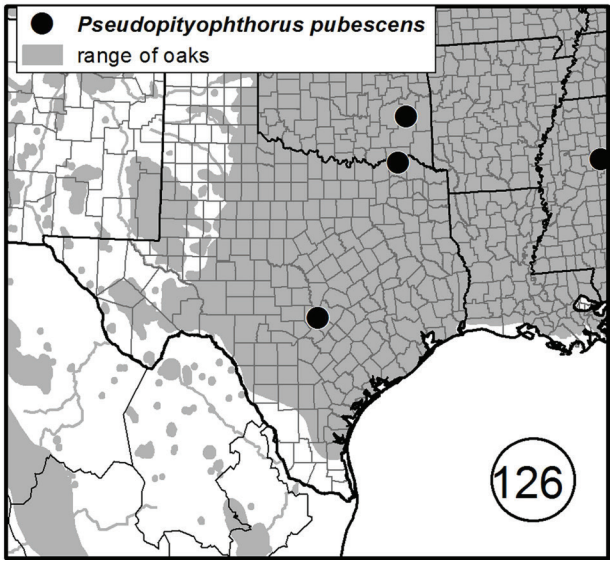

Pityophthorus virilis
121

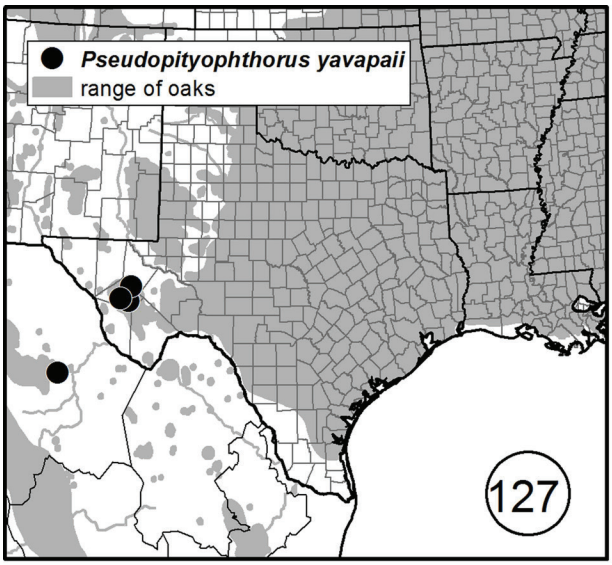

Pseudopityophthorus asperulus
range of oaks
122

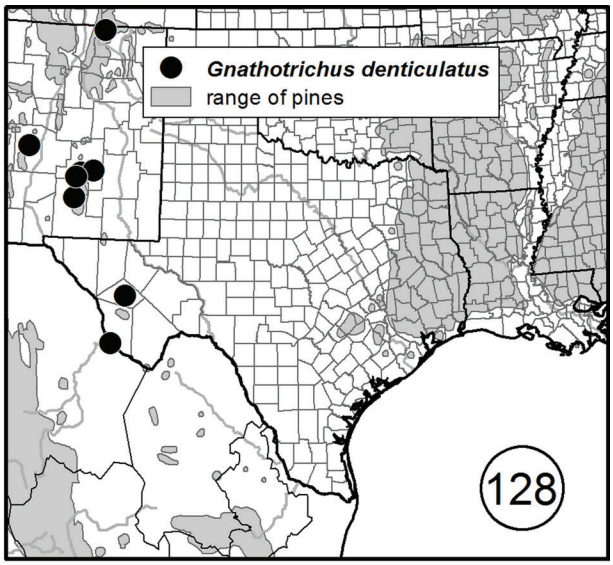

Pseudopityophthorus denticulus
range of oaks
123

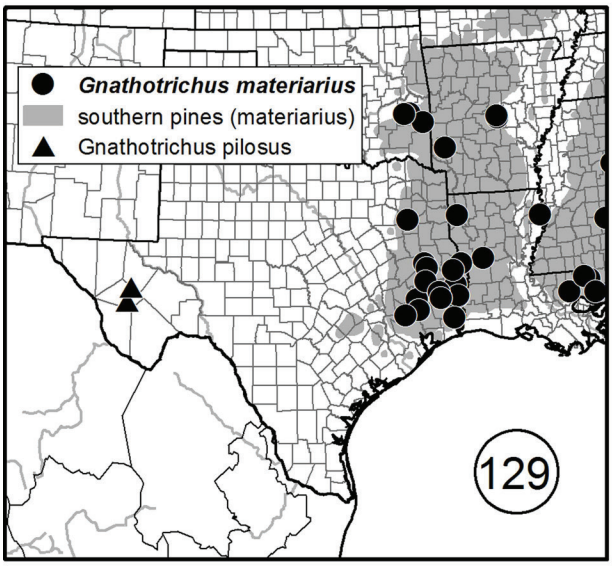

Pseudopityophthorus minutissimus
range of oaks
124

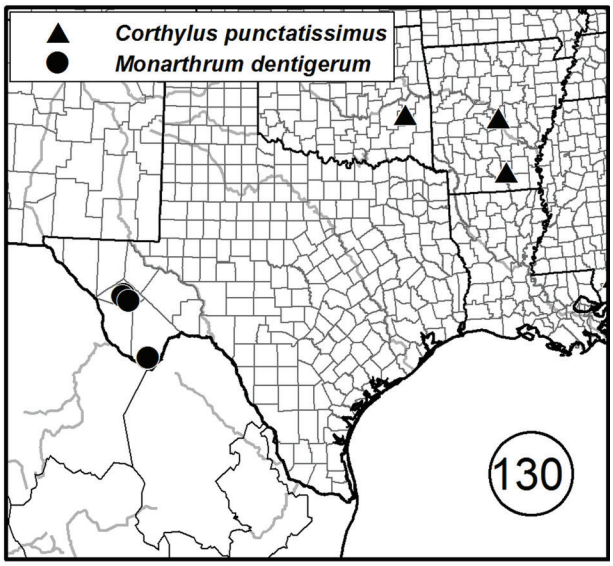

Pseudopityophthorus pruinosus
range of oaks
125

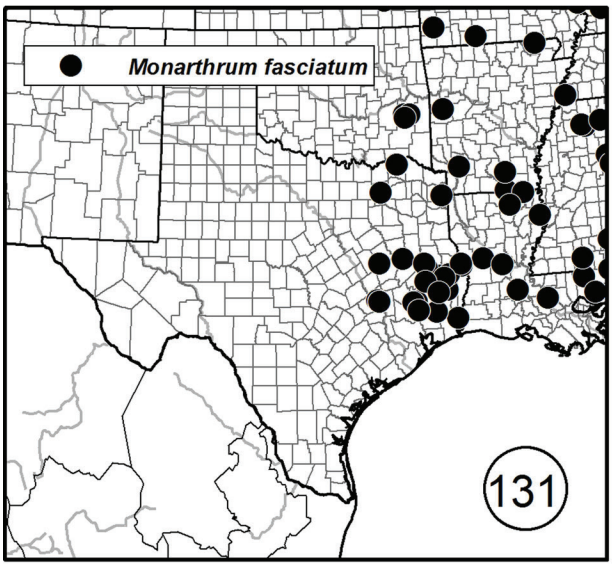

Pseudopityophthorus pubescens
range of oaks
126

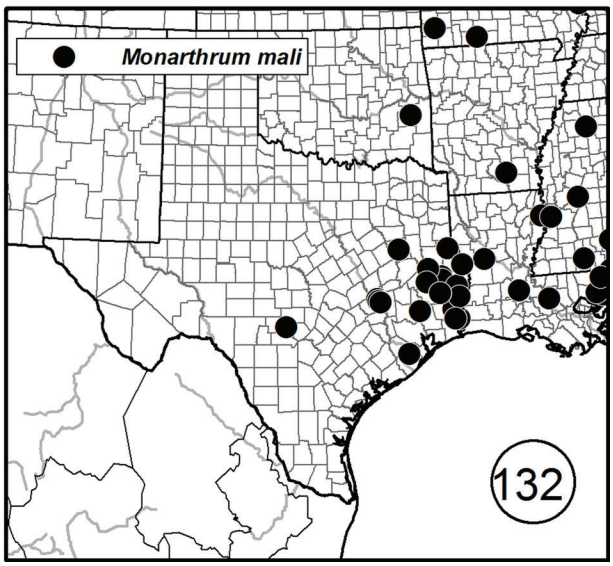

Pseudopityophthorus yavapaii
range of oaks
127


Gnathotrichus denticulatus
range of pines
128


Gnathotrichus materiarius
southern pines (materiarius)
Gnathotrichus pilosus
129


Corthylus punctatissimus
Monarthrum dentigerum
130


Monarthrum fasciatum
131


Monarthrum mali
132