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Front cover: *Plathemis lydia* (Drury), immature male, St. Catherine Creek National Wildlife Refuge, Adams County, Mississippi, March 2006. Photo by R. Stephen Krotzer.

The Odonata Of Mississippi

R. Stephen Krotzer¹, Jason T. Bried², Mary Jane Krotzer³

Abstract

An annotated faunal list of the Odonata occurring in Mississippi is presented, totaling 144 species (100 Anisoptera, 44 Zygoptera). Five species—*Enallagma davis* Westfall, *Gomphus* (*Hylogomphus*) *geminatus* Carle, *Epithea* (*Tetragoneuria*) *spinosa* (Hagen in Selys), *Neurocordulia alabamensis* Hodges, and *Miathyria marcella* (Selys), are documented from the state for the first time. The presence in Mississippi of *Celithemis bertha* Williamson, previously reported from the state based on a misidentification, is confirmed. Four species from earlier Mississippi lists are removed, and nine potential additions to the state's fauna are discussed. A brief history of odonatological inventory in Mississippi is given, along with a discussion of the state's physiography and aquatic resources, relationships of its odonate fauna to that of its neighboring states, and potential conservation measures that could benefit odonates and their habitats.

Introduction

The state of Mississippi has historically been an under-collected area in terms of its odonate fauna. The earliest published references to the Mississippi odonate fauna are apparently those of Muttkowski (1910) and Davis (1914), who reported on the occurrence of *Enallagma signatum* and *Anax longipes*, respectively, in the state. Wright (1937, 1939, 1943), in a series of reports dealing with the coastal region of Mississippi, added *Lestes vigilax*, *Enallagma dubium*, *Erythrodiplax minuscule*, and *Macrodiplax balteata* to the state list, but stated that he had never seen nor heard of *Anax longipes* occurring in Mississippi. Other early odonatists contributing Mississippi records during this time included Borror (1942; *Erythrodiplax berenice*), Needham (1942; *Gomphus* [*Gomphurus*] *modestus*, *Stylurus potulentus*), and Westfall (1943; *Libellula auripennis*, *L. needhami*).

The first "checklist" for the state was published by Bick (1950), including Anisoptera only. Stating that "Mississippi is an almost total blank in our knowledge of dragonfly distribution", Bick listed a total of 50 species of dragonflies for the state, based mainly on specimens housed at Mississippi State College (now Mississippi State University) in Starkville and also on specimens he collected in the vicinity of Oxford, in north central Mississippi. Bick noted that only 31 of the state's 82 counties were represented in the collections, and he stated "much more widespread collecting is needed in order to obtain a thorough state survey".

Westfall (1952) added 23 species of Anisoptera to the Mississippi list; three of these species have subsequently been

either synonymized (*Epithea* [*Epicordulia*] *regina* with *E. princeps* and *E.* [*Tetragoneuria*] *williamsoni* with *E. costalis*) or assigned subspecific status (*Macromia georgina* to *M. illinoensis georgina* [Donnelly & Tennesen, 1994]). In 1953, Bick confirmed Davis' earlier disputed record of *Anax longipes* from the state, and Westfall (1956), correcting a misidentification, deleted *Gomphus* (*Gomphurus*) *fraternus* from the list, replacing it with *G. hybridus*. Kormondy (1960), Richmond (1962, 1968), and Dunkle (1975) contributed additional species to the Mississippi list, bringing the total number of Anisoptera known from the state to 74.

Bick (1978) added seven species of Zygoptera to the three previously documented Mississippi species. In 1979, Lago, Stanford, and Hartfield added greatly to that total, publishing the first statewide faunal list for damselflies. With that publication, the number of species of damselflies known from Mississippi swelled to 35, and 109 species of odonates were now documented for the state.

Stanford and Lago (1981), Louton (1982), Dunkle (1983), Lago and Testa (1987), Bick (1990), Carle (1992), Mauf-ray (1999), Needham, Westfall, and May (2000), and Bried (2002) each added species to the faunal list. Then, in 2004, Donnelly published his monumental Dot Map Project (DMP) (Donnelly, 2004a, 2004b, 2004c). As part of this work, three additional species were reported from Mississippi for the first time, and over 900 county records were documented for the state. Most recently, the occurrence of two additional species in Mississippi was documented by Bried and Krotzer (2005).

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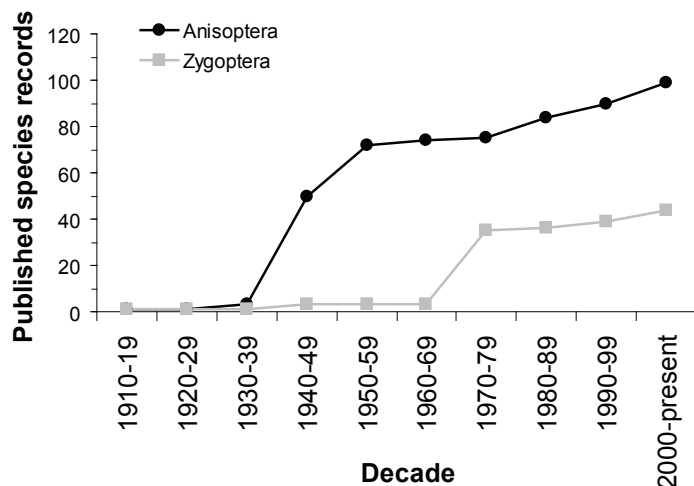


Figure 1. Historic accumulation of Odonata species records in Mississippi.

We document here for the first time an additional five species of Odonata occurring in Mississippi; we confirm the presence of another species which was apparently reported from the state based on a misidentification. We choose to remove several species for reasons explained elsewhere in this publication, resulting in a current faunal list totaling 144 species, comprising 100 species of Anisoptera and 44 species of Zygoptera. Through intensive surveys over the last several years (e.g., Bried, 2005; Bried & Ervin, 2005), and by examining the holdings of several of the state's academic and research institutions, we have also increased the total number of county records to 2,476. The species and distribution lists have expanded greatly over the past century (Fig. 1) and in the short time since Mississippi was cited as one of the most under-surveyed states for Odonata (Donnelly, 2002). As of June 2002 the Mississippi checklist of 114 species exceeded that of 15 other states (based on Donnelly, 2002); the current species total (144) now exceeds reported totals in 28 other states (based on Abbott, 2007).

Aquatic Habitat, Climate, and Physiography

The state of Mississippi spans 47,716 square miles (123,584 km²) divided into 82 counties (Fig. 2), lying entirely within the Gulf Coastal Plain physiographic province and comprising three ecoregions (Mississippi River Alluvial Plain, Upper East Gulf Coastal Plain, East Gulf Coastal Plain). More than two-thirds of this land base is in private ownership (MCWCS, 2005), with the bulk of public lands found across six National Forests (totaling approximately 485,000 ha) and 14 National Wildlife Refuges (~77,000 ha) (Fig. 3A). Mississippi has 44 miles of coastline, approximately 450 square miles of inland surface water, four major river drainages (Mississippi, Big Black, Pearl, Yazoo) emptying into the Gulf of Mexico or Mississippi River, and several large reservoirs (Ross Barnett, Arkabutla, Sardis, Grenada)

(Fig. 3C). The state is roughly 4% open water (483,586 ha), 13% woody wetland (1,651,047 ha), and 1% herbaceous wetland (98,036 ha) based on recent estimates by the Southeast GAP Analysis Project (Vilella et al., 2003). There are freshwater lakes, ponds, oxbows, dammed river channels, sloughs, borrow pits, bayous, marshes, swamps, and bogs. Much of this lentic resource is human made or influenced (e.g., catfish and cattle ponds), as opposed to naturally occurring or unaltered.

The National Wildlife Refuges support wintering waterfowl, migratory Neotropical songbirds, alligators, and small fur-bearers (e.g., mink, swamp rabbit) across thousands of acres of bottomland forests, bald cypress-tupelo sloughs, pond cypress bays, wet pine savannah, greentree reservoirs (Ervin et al., 2006), lake reservoirs, moist-soil managed wetlands (Gray et al., 1999), and various classes of flowing water. Relatively ubiquitous aquatic and wetland woody vegetation across the state includes bald cypress, black willow, red maple, and buttonbush, but physiognomy and species composition vary greatly by physiography and wetland type. Lotic systems are low-gradient tannic creeks and streams, in addition to slow-moving rivers carrying heavy suspended sediment loads (Faulkner, 2005; Stewart, 2005).

Climate is typical of the warm-temperate and subtropical Gulf Coastal Plain, with wide temperature variation and frequent heavy amounts of rainfall. Winters are generally short and mild, whereas summers bring high humidity and extreme heat. The lowest and highest temperature records are -19°F and 115°F, respectively, with monthly mean temperatures ranging from about 35°F to 92.5°F across the state. High temperatures may exceed 90°F for up to 100 days per year. Precipitation patterns follow a latitudinal gradient, with greatest amounts near coastal areas. Most of the state experiences 125–175 cm mean annual rainfall. Hurricanes can occur from late summer through autumn. Ice storms, snowfalls, and sleet are rare, especially in coastal areas.

The state may be further loosely subdivided into nine physiographic regions based on historic forest types and broad formations of physiognomy, soils, and topography (Faulkner, 2005; Stewart, 2005) (Fig. 3B). Distinctions between these physiographic regions can be fairly subtle and gradual, and many species of odonates move freely among them, so long as adequate and suitable breeding habitat exists. However, there are some species that are more or less characteristic of each of these regions, as discussed below.

A large level floodplain (the “Delta”) extends from the Mississippi River east to the foothills of the loess bluffs in the north-west portion of the state. Most streams in this region have

been channelized or otherwise severely altered. In addition to naturally occurring oxbow lakes and swamps, many man-made ponds, such as commercial catfish ponds, may be found here. Odonates typically associated with aquatic habitats in the Delta include *Telebasis byersi*, *Nasiaeschna pentacantha*, *Arigomphus maxwelli*, and *A. submedianus*.

The Loess Hills are highly erodable brown loams, very steep in some places with deeply dissected topography. Further east they grade into the North Central Hills, characterized by sandy or clay-laden ridges and valleys topped with mixed hardwoods and pines (loblolly and shortleaf). Streams in these two regions are generally small, often entrenched, with sandy/clay substrata. Man-made ponds are scattered throughout this area, along with occasional springs, seeps, beaver pond complexes, etc. There are also several large reservoirs in this area. Some species typical of these regions include *Chromagrion conditum*, *Gomphus* (*Gomphus*) *exilis*, *Somatochlora tenebrosa*, and *Libellula pulchella*.

The flat to gently rolling blackland prairie (including the Black Belt and Jackson Prairie physiographic regions) is punctuated by chalk outcrops, cedar glades, and small remnants of prairie vegetation (Barone, 2005). Streams in these regions are usually small, entrenched, and shallow, with little diversity of habitat for odonates. There are many man-made ponds, ranging from small fishing or livestock ponds to large commercial catfish production ponds, in this part of the state. Odonate species often seen in the prairie regions include *Enallagma basidens*, *Brachymesia gravida*, *Celithemis eponina*, and *Libellula luctuosa*.

The prairie belt gives way to the ravines and ridges of the Tombigbee Hills in the northeast extreme, a region containing the highest elevation in the state (Woodall Mountain, 806 feet a.s.l.). Most of the streams in this region have been degraded, although a few remain with stable gravel/cobble substrates. Species typical of this region include *Argia translata*, *Stylogomphus albistylus*, *Somatochlora linearis*, and *Sympetrum vicinum*.

The inland southern half of Mississippi comprises the South Central Hills and Pine Hills physiographic regions, an area of rolling hills and occasional steep-sided ravines and valleys, with areas of longleaf pine found east of the Pearl River. Streams in these regions are generally clear, sandy, and often tannin-stained. Beaver pond/swamp complexes are com-



Figure 2. Counties of Mississippi.

mon in this part of the state, and man-made ponds are also abundant. Some characteristic odonate species of this area include *Calopteryx dimidiata*, *Stylurus laurae*, *Macromia alleghaniensis*, and *Celithemis ornata*.

The South Central and Pine Hills regions merge in south Mississippi with the Coastal Zone, an area of flatwoods, pine meadows, fire-dependent savannas, low sandy bluffs, and saline marshes. *Enallagma durum*, *E. pollutum*, *Erythrodiplax berenice*, and *Libellula needhami* are among those species typically associated with Coastal Zone habitats.

Faunal Origins And Relationships

Many of Mississippi's odonate species can be found throughout the state, which is not surprising given that the entire state lies within the Gulf Coastal Plain physiographic prov-

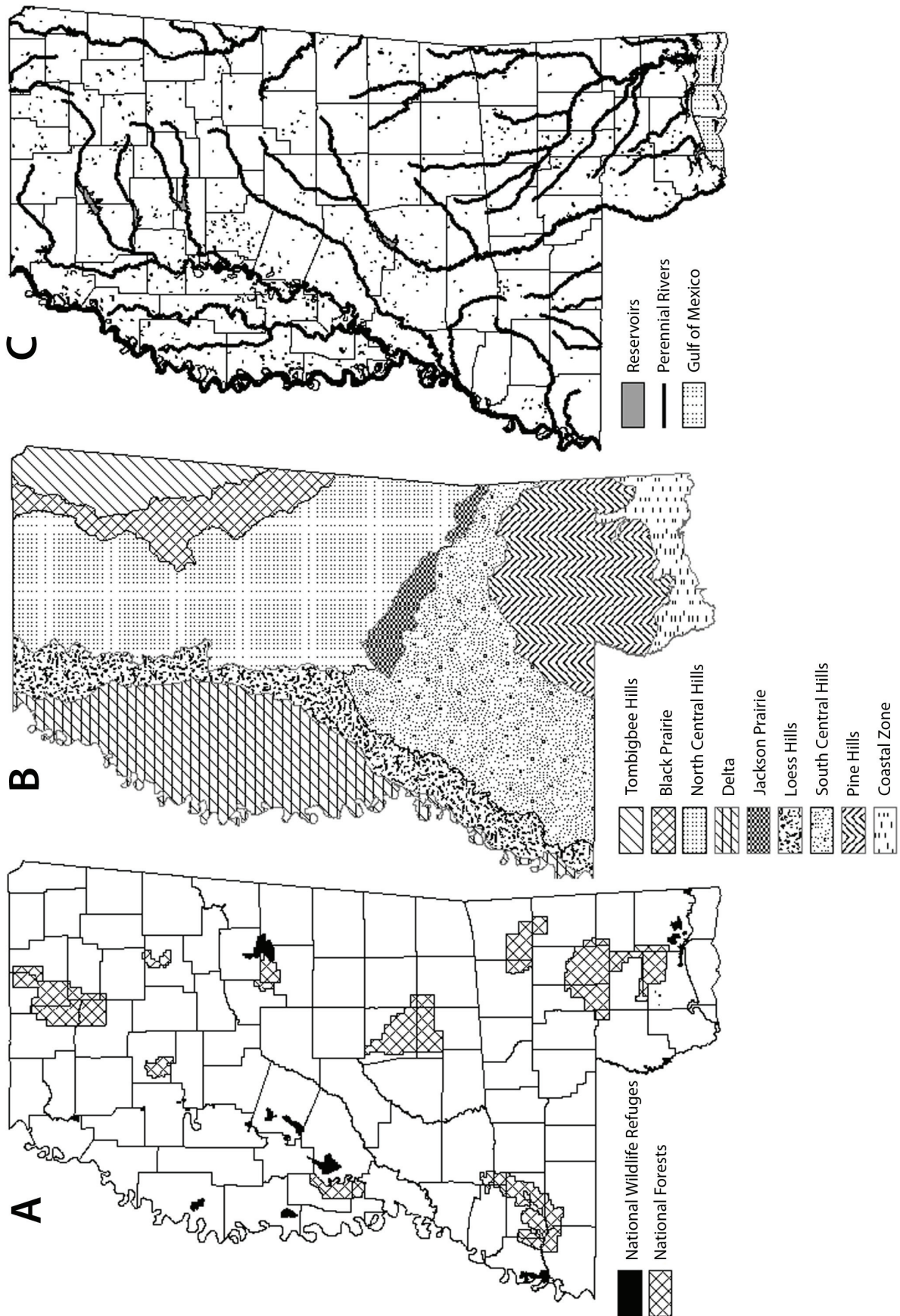


Figure 3. Major public/protected lands (A), physiography (B), and hydrography (C) of Mississippi.

ince, with no major barriers (mountain ranges, deserts, etc.) to prevent their dispersal from one suitable habitat to another. There are, however, species occurring in the state whose distributions essentially end in Mississippi. Several enter the state from the east, but are not known to occur in states west of the Mississippi River (at least in the southern US); *Nannothemis bella* and *Stylurus townesi* are examples. Other, more northern species, such as *Amphiagrion saucium*, *Chromagrion conditum*, *Aeshna umbrosa*, *Stylogomphus albistylus*, and *Neurocordulia yamaskanensis*, have distributions that barely penetrate south into Mississippi. Species which are largely restricted to the extreme southern portion of the coastal plain in the southeastern US, and which are confined in Mississippi to the southern group of counties, include (but are not limited to) *Enallagma concisum*, *E. pollutum*, *Dromogomphus armatus*, *Gomphus* (*Gomphus*) *hodgesi*, *Stylurus potulentus*, and *Celithemis amanda*. Finally, *Lestes forficula*, *Aphylla angustifolia*, and *Arigomphus lentulus* are apparently the only species for which Mississippi represents the eastern extent of their range, and of these only *A. lentulus* is known to have a reproducing population in the state (Bried & Krotzer, 2005). There are no odonate species endemic to Mississippi.

The species composition of Mississippi's odonate fauna was compared with that of its immediate neighbors (Alabama, Arkansas, Louisiana, and Tennessee) by pairing Mississippi with each neighbor state and computing Jaccard's Coefficient of Community Similarity (J_s) for each pair. The classic coefficient is expressed as $J_s = A / (s_1 + s_2 - A)$, where s_1 is the number of species in community 1, s_2 is the number of species in community 2, and A is the number of species commonly shared between the communities. The J_s ranges from 0 (no species shared) to 1 (identical composition).

The current known odonate fauna of Mississippi is most similar to that of Louisiana ($J_s=0.773$) and Alabama ($J_s=0.760$), and shows less overlap with Arkansas ($J_s=0.632$) and Tennessee ($J_s=0.583$). It is a bit surprising that Mississippi has relatively so much overlap with the Alabama fauna given the large difference in species number between these states. One reason for the gap is that the Appalachian Foothills, which terminate in Alabama, provide habitat for several species (e.g., *Gomphus rogersi*, *G. parvidens*) not likely to be found in Mississippi. Possibly mitigating this difference is the fact that Mississippi shares a longer border with Alabama than with any of the other three states, thus facilitating species exchange between these two states. Louisiana, with a similar physiography to that of Mississippi, and also with a sizeable shared border, should be expected to have an odonate fauna similar to Mississippi's. It is likewise not surprising that Arkansas, with its isolated mountain ranges and Ozark/Ouachita endemics, and Tennessee, with its eastern mountain ranges that allow for infiltration of more northerly species,

have relatively less observed compositional similarity with Mississippi. A caveat here is that species lists are incomplete in all five states. However, the number of undocumented species is probably low, and we doubt it affects these conclusions to any great extent.

Annotated List Of Mississippi Odonata

The annotated list provides the following information about each species known to occur in Mississippi: scientific name; documented flight season in the state; earliest literature record for the species' occurrence within the state; list of counties in which the species is known to occur; and general habitat notes. County records are based predominately on adult specimens; nymphal records are mainly those collected and/or identified by the senior author or Ken Tennesen. We have chosen not to include many of the nymphal records from the literature, especially the earlier literature, due to a higher probability of misidentifications. However, if nymphal records from the literature are the only records for a species in the state, or if they are for a species that can be reliably identified in the nymphal stage (e.g., *Hagenius brevistylus*), they are included here. The only sight records included in this list are those of male *Anax longipes*, which possesses the unique combination of being unmistakable, even in flight, and of being almost impossible to capture. The reader should keep in mind that flight season data for Mississippi, as for most southern states, are woefully incomplete, and the dates given here may not be truly representative of the actual flight season in many cases. Habitat and other notes are based on the literature and on the authors' observations.

In addition to literature records, distributional data were gathered from a variety of sources. The odonate holdings at the Mississippi Museum of Natural Science (MMNS), the Mississippi Entomological Museum (MEM), the University of Mississippi (UM), and the Florida State Collection of Arthropods (FSCA) were examined for previously unpublished Mississippi records. Several colleagues have provided us with their Mississippi records (see Acknowledgements), and many county records were generated during the southeastern Dragonfly Society of the Americas meeting held in Yazoo City, Mississippi during 2005. Lastly, the authors have collected extensively throughout Mississippi over the last several years in an attempt to more thoroughly document species' distributions and to provide a more even coverage of the state. Nevertheless, the habitat, geographic, and temporal coverage is incomplete and inventory work has been constrained and to some extent biased by the limited availability of and access to public land. The most frequently visited and replicated types of aquatic habitat surveyed by the authors in the last five years were bottomland forests, beaver impoundments, and farm ponds, whereas larger streams and

rivers have received less attention. We anticipate that habitat modeling (e.g., see Finch et al., 2006) plus appropriately timed, habitat-focused survey work will most effectively fill the remaining gaps in species' distributions across the state.

Abbreviations: JB = Jason Bried; MJK = Mary Jane Krotzer; SK = Steve Krotzer; (N) = nymphal/exuvial record.

The following species accounts are current as of December 2007.

ZYGOPTERA

CALOPTERYGIDAE

Calopteryx dimidiata Burmeister

26 March–28 September; Lago et al., 1979; Alcorn, Amite, Benton, Claiborne, Clarke, Covington, Forrest, George, Hancock, Harrison, Itawamba, Jackson, Kemper, Lafayette, Lamar, Lincoln, Marion, Marshall, Monroe, Newton, Pearl River, Perry, Pike, Prentiss, Simpson, Stone, Walthall.

Found in small to medium clear, flowing streams. Likely to be found statewide in appropriate habitat, with possible exception of the upper Delta.

Calopteryx maculata (Beauvois)

13 April–16 November; Lago et al., 1979; Adams, Alcorn, Amite, Benton, Calhoun, Carroll, Chickasaw, Choctaw, Claiborne, Clarke, Copiah, Forrest, Franklin, George, Hinds, Holmes, Itawamba, Jackson, Jasper, Jefferson, Jefferson Davis, Lafayette, Lamar, Lauderdale, Lee(N), Lincoln, Marion, Marshall, Neshoba, Newton, Panola, Pearl River, Pike, Pontotoc, Prentiss, Rankin, Simpson, Stone, Tippah, Tishomingo, Union, Walthall, Warren, Wilkinson, Winston, Yalobusha, Yazoo.

Occurs in a variety of streams, from very small to large, usually associated with shade. Likely to be found throughout Mississippi.

Hetaerina americana (Fabricius)

26 March–17 October; Lago et al., 1979; Adams, Benton, Carroll, Copiah, Covington, Jefferson, Lafayette, Lawrence, Lincoln, Marshall, Monroe, Newton, Pearl River, Pike, Simpson, Stone, Tishomingo, Union, Walthall, Warren, Wilkinson.

Found along sunny areas of flowing, clear streams of varying size, where it is usually associated with streamside vegetation. Occurs throughout most of the state, and is surprisingly common in the extreme southwestern counties.

Hetaerina titia (Drury)

17 June–12 December; Lago et al., 1979; Clay, Copiah, Greene, Hancock, Jackson, Jefferson, Lafayette, Lamar, Leake, Monroe, Pearl River, Pike, Stone, Tishomingo, Warren, Wayne.

Uncommonly encountered in the state; found along small to large, clear to tannin, gently flowing streams.

LESTIDAE

Lestes australis Walker

8 April–6 November; Lago et al., 1979; Amite, Calhoun, Forrest, Greene, Hancock, Harrison, Hinds, Itawamba, Jones, Lamar, Marion, Marshall, Monroe, Panola, Pearl River, Perry, Scott, Sharkey, Tunica.

Recently elevated from subspecific status by Donnelly (2003); likely to be found statewide in Mississippi at a variety of lentic habitats including ponds (permanent and temporary), swamps, and sluggish streams.

Lestes forficula Rambur

17 September–24 September; Bried & Krotzer, 2005; Oktibeha, Winston.

Not known from Mississippi prior to 2004, when JB collected two individuals and observed another within a week at different localities in the east-central portion of the state. All were males, and it is unclear whether a breeding population exists. The nearest known populations of the species were believed to occur in Texas; however, a breeding population was recently discovered in St. Landry Parish, Louisiana during 2007, at a frequently visited site where the species had not previously been documented (Strickland & Strickland, 2007). Recent major hurricanes (Ivan, Katrina) may have displaced a few *L. forficula* from Texas eastward into Louisiana and Mississippi.

Lestes inaequalis Walsh

5 May–4 August; Lago et al., 1979; Choctaw, Hancock, Holmes, Humphreys, Leake, Leflore, Marshall, Pike, Talahatchie, Tishomingo, Warren, Washington.

Probably occurs statewide, but tends to be found in localized populations. We found it most often around the vegetated fringe of backwater swamps and marshy ponds.

***Lestes rectangularis* Say**

19 May–11 July; Lago et al., 1979; Adams, Lamar, Noxubee, Simpson, Washington.

Very common throughout much of the eastern and central US; apparently at the periphery of its range in Mississippi and not common. Occurs in vegetated, marginal areas of oxbow sloughs, swamps, and ponds.

***Lestes vigilax* Hagen**

20 May–19 September; Wright, 1943; Adams, Alcorn, Choctaw, Clarke, Forrest, Jackson, Kemper, Lafayette, Lamar, Marion, Marshall, Noxubee, Perry, Simpson, Stone, Union.

Found to date only at a handful of widely scattered localities, but is probably fairly common throughout the state at suitable habitat, namely shaded margins of swamps, marshes, oxbow sloughs, and ponds.

COENAGRIONIDAE

***Amphiagrion saucium* (Burmeister)**

4 April–6 June; Lago et al., 1979; Benton, Calhoun, Lafayette, Marshall, Tippah.

Restricted to the extreme northern portion of the state, where it is very uncommon. Breeding habitat is seepage streams and pockets of spring-fed drainages, often with *Sphagnum*, in forested areas.

***Argia apicalis* (Say)**

13 May–27 September; Bick, 1978; Adams, Alcorn, Attala, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Clarke, Clay, Coahoma, Copiah, Covington, Desoto, Greene, Grenada, Hancock, Harrison, Hinds, Humphreys, Issaquena, Itawamba, Jackson, Jefferson, Jones, Kemper, Lafayette, Lamar, Lauderdale, Lawrence, Leake, Leflore, Lowndes, Madison, Marshall, Monroe, Noxubee, Oktibbeha, Quitman, Rankin, Scott, Sharkey, Simpson, Smith, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Union, Walthall, Warren, Webster, Winston, Yazoo.

Very common throughout the state at rivers, larger streams, and reservoirs, and fairly common around ponds and smaller lakes.

***Argia bipunctulata* (Hagen)**

14 April–4 September; Lago et al., 1979; Benton, Clarke, George, Greene, Harrison, Itawamba, Jackson, Lafayette,

Marion, Stone, Tishomingo.

Probably absent from the upper Delta, but is expected to occur in highly localized populations elsewhere in the state. Habitat is restricted to tiny seepage streams and marshy seeps.

***Argia fumipennis* (Burmeister)**

1 April–15 November; Lago et al., 1979; Alcorn, Benton, Choctaw, Clarke, Covington, Desoto, Forrest, Franklin, George, Greene, Hancock, Harrison, Hinds, Jackson, Jasper, Kemper, Lafayette, Lamar, Marion, Marshall, Monroe, Neshoba, Pearl River, Perry, Rankin, Scott, Simpson, Stone, Tippah, Tishomingo, Webster, Wilkinson.

A highly variable species commonly encountered throughout the state at a variety of habitats, including seepage streams, marshy wet meadows, and vegetated pond and stream margins. There are no records to date from the upper Delta region, but the species likely occurs there. Specimens we have seen from extreme north Mississippi are typically of the form *violacea*, those from extreme south Mississippi of the form *fumipennis*, and those of the intervening counties intermediate between the two.

***Argia moesta* (Hagen)**

27 April–10 October; Lago et al., 1979; Adams, Amite, Benton, Carroll, Chickasaw, Clarke, Copiah, Covington, Forrest, Franklin, George, Greene, Hancock, Harrison, Holmes, Itawamba, Jefferson, Kemper, Lafayette, Lamar, Lauderdale, Lawrence, Leake, Lincoln, Madison, Marshall, Monroe, Oktibbeha, Pearl River, Perry, Rankin, Simpson, Smith, Stone, Tippah, Tishomingo, Union, Walthall, Warren, Wilkinson, Yazoo.

Very common throughout most of the state at larger streams, rivers, and larger reservoirs; also found at small streams. There are no records for many of the upper Delta counties, but the species almost certainly occurs there.

***Argia sedula* (Hagen)**

18 May–17 October; Lago et al., 1979; Adams, Benton, Carroll, Chickasaw, Clarke, Clay, Copiah, Covington, Harrison, Hinds, Itawamba, Jefferson, Kemper, Lafayette, Lincoln, Lowndes, Madison, Marshall, Monroe, Pearl River, Pontotoc, Rankin, Simpson, Stone, Tishomingo, Union, Walthall, Warren, Wilkinson.

Another very common damselfly that probably occurs statewide, although there are no records from many of the upper Delta counties. Habitat includes medium to large streams, rivers, and occasionally ponds and reservoirs.

Argia tibialis (Rambur)

7 April–2 October; Lago et al., 1979; Adams, Alcorn, Amite, Attala, Benton, Calhoun, Carroll, Claiborne, Clarke, Clay, Copiah, Desoto, Forrest, Franklin, George, Greene, Hancock, Harrison, Hinds, Holmes, Humphreys, Itawamba, Jackson, Jasper, Jefferson, Jones, Kemper, Lafayette, Lamar, Lawrence, Leake, Lincoln, Madison, Marion, Marshall, Monroe, Montgomery, Neshoba, Newton, Noxubee, Oktibbeha, Pearl River, Perry, Pontotoc, Rankin, Sharkey, Simpson, Smith, Stone, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Union, Walthall, Warren, Washington, Webster, Wilkinson, Yazoo.

The most commonly encountered *Argia* in Mississippi, occurring statewide along small streams to large rivers.

Argia translata Hagen

18 July–10 October; Lago et al., 1979; Lafayette, Tishomingo.

Only known from extreme northern Mississippi; unlikely to occur outside of the northeast quarter of the state. Habitat throughout its range is generally medium to large, often rocky, rivers.

Chromagrion conditum (Selys)

20 March–29 May; Lago et al., 1979; Lafayette, Marshall, Tishomingo(N).

This northern species is probably restricted to the northeast corner of the state. It was found along the boggy edges of spring seepage streams and spring-fed ponds.

Enallagma aspersum (Hagen)

29 April–20 September; Lago et al., 1979; Choctaw, Copiah, Lafayette, Lawrence, Marshall.

Uncommonly encountered, collected at a few widely scattered localities throughout the state; apparently absent from the coastal counties. Preferred habitat is small, shallow ponds, usually without fish.

Enallagma basidens Calvert

29 April–26 September; Bick, 1978; Adams, Attala, Chickasaw, Choctaw, Covington, Hinds, Kemper, Lee, Lowndes, Oktibbeha, Pontotoc, Prentiss, Scott, Simpson, Tippah, Union, Wilkinson, Winston, Yazoo.

Common across the state, with the possible exception of the coastal counties; found around ponds, reservoirs, and very slow streams.

Enallagma civile (Hagen)

6 April–6 November; Lago et al., 1979; Benton, Bolivar, Calhoun, Carroll, Clay, Harrison, Hinds, Holmes, Humphreys, Issaquena, Jackson, Jefferson, Jefferson Davis, Kemper, Lafayette, Leflore, Lowndes, Madison, Marshall, Noxubee, Oktibbeha, Pontotoc, Prentiss, Scott, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Warren, Washington, Yalobusha.

Very common in Mississippi; undoubtedly occurs in every county. Probably occurs at almost any permanent lentic habitat, including newly constructed ponds, brackish or mineralized waters, and even occasionally along stream pools.

Enallagma concisum Williamson

10 April; Bick, 1978; Harrison.

Probably restricted to the extreme southern portion of the state, where the preferred habitat appears to be the shallow portions of heavily vegetated ponds.

Enallagma daeckii (Calvert)

23 May–18 June; Bick, 1978; Adams, Benton, Choctaw, Harrison, Jackson, Lamar, Marshall, Stone.

Not common, but certainly more widely distributed in the state than current records indicate. Prefers the shaded edges of swampy, heavily vegetated ponds or lakes, and has a relatively short flight season, so easily overlooked. Locally abundant adult populations were found in beaver wetlands in the Tombigbee National Forest, Ackerman Unit, Choctaw County.

Enallagma davisii Westfall

9 April–13 April; New State Record; Stone.

The presence of this species in the state is based on a previously unidentified male, collected in 1981, discovered by SK in the UM collection. The collection locality was a small pond in the southern part of the state (Paul Lago, personal communication). A visit to this pond by SK in 2007 revealed the presence of a healthy breeding population. In other parts of its range, *E. davisii* inhabits sand-bottomed ponds and lakes as well as their outflows. It is probably restricted to the southern tier of counties in Mississippi.

Enallagma divagans Selys

25 March–22 June; Lago et al., 1979; Benton, Choctaw, Clarke, Hancock, Harrison, Itawamba, Jasper, Kemper,

Lafayette, Lamar, Lincoln, Marshall, Neshoba, Perry, Scott, Simpson, Stone, Winston, Yalobusha.

Fairly common; although not yet reported from the western-most counties, overall range indicates it should occur there. The habitat of this early season species includes shaded, vegetated margins of ponds, swamps, and lakes, as well as small stream pools and seepage drains.

Enallagma doubledayi (Selys)

9 April–13 June; Lago et al., 1979; Amite, Forrest, Marion, Marshall, Stone.

Known from a few widely scattered localities with appropriate habitat in the extreme north and the extreme south of the state; probably occurs at other similar localities statewide. Generally found around small ponds and probably often ignored by collectors, due to its close resemblance to the ubiquitous *E. civile*.

Enallagma dubium Root

7 May–19 September; Wright, 1943; Adams, Choctaw, Copiah, Greene, Harrison, Jackson, Marion.

More likely to be found in the southern part of the state, although apparently uncommon throughout. Prefers heavily vegetated waters, including swamps, ponds, and sluggish streams, often with water lilies or other floating aquatic plants.

Enallagma durum (Hagen)

25 May–29 June; Lago & Testa, 1987; Hancock, Harrison, Jefferson Davis, Walthall.

Generally considered to be a coastal species, although we have collected it at man-made ponds well inland. Usual habitat is still or very slowly moving waters, often brackish or mineralized.

Enallagma exsulans (Hagen)

19 April–7 September; Bick, 1978; Alcorn, Amite, Calhoun, Carroll, Clarke, Clay, Coahoma, Copiah, Greene, Hancock, Hinds, Holmes, Itawamba, Lauderdale, Lawrence, Leake, Lincoln, Lowndes, Monroe, Newton, Panola(N), Pearl River, Pike, Pontotoc, Simpson, Smith, Tippah, Tishomingo, Union, Walthall, Warren, Yazoo.

A statewide stream species; found in small and large streams, and occasionally in lakes and reservoirs.

Enallagma geminatum Kellicott

4 April–17 October; Lago et al., 1979; Coahoma, Forrest, Greene, Kemper, Lafayette, Lawrence, Leflore, Marshall, Monroe, Neshoba, Scott, Winston, Yazoo.

Has been collected at scattered localities across the state and probably occurs statewide in suitable habitat, which includes ponds and lakes with floating vegetation.

Enallagma pallidum Root

7 May–16 June; Westfall & May, 1996; Hancock, Harrison, Jackson.

Apparently reaches the western limit of its range in Mississippi; almost certainly restricted to the extreme southern portion of the state. Habitat is usually ponds and lakes with shaded, vegetated borders.

Enallagma pollutum (Hagen)

10 April–31 July; Bick, 1978; Hancock, Harrison.

Collected only in coastal counties to date; likely restricted to the extreme southern part of the state. Often found around ponds as well as sluggish stream pools.

Enallagma signatum (Hagen)

26 March–10 October; Muttkowski, 1910; Adams, Amite, Attala, Calhoun, Carroll, Choctaw, Claiborne, Copiah, Forrest, Franklin, Greene, Hinds, Issaquena, Jasper, Kemper, Lafayette, Leflore, Lowndes, Madison, Marion, Marshall, Monroe, Neshoba, Noxubee, Panola, Perry, Rankin, Scott, Tippah, Tishomingo, Tunica, Union, Walthall, Warren, Washington, Winston, Yazoo.

Extremely common throughout the state; probably occurs in all counties. Can be found at a variety of habitats—small to large ponds, lakes, reservoirs, and rivers.

Enallagma traviatum Selys

20 May–20 September; Lago et al., 1979; Alcorn, Carroll, Choctaw, Clarke, Copiah, Jasper, Jefferson Davis, Kemper, Lafayette, Lawrence, Marshall, Neshoba, Prentiss, Scott, Tippah, Union, Winston, Yalobusha.

Occurs in scattered localities across the northern $\frac{3}{4}$ of the state; possibly absent from the extreme southern counties along the Gulf Coast. Preferred habitat appears to be vegetated, shaded ponds. Most of Mississippi appears to fall within the range of *E. t. westfalli* (Donnelly, 1973).

Enallagma vesperum Calvert

8 May–19 October; Bried, 2005; Leflore, Marshall, Noxubee, Oktibbeha, Scott, Yalobusha(N).

Only recently reported from the state; now known from several scattered localities and presumably more common than that, but undercollected due to its dusk flight period. Inhabits ponds, lakes, and even man-made reservoirs, usually associated with floating aquatic vegetation.

Enallagma weewa Byers

16 June–19 September; Westfall & May, 1996; George, Hancock, Lamar, Pearl River, Stone.

Probably restricted to the extreme southern part of the state, where it occurs along tannin-stained, forested streams.

Ischnura hastata (Say)

16 March–3 November; Richmond, 1962; Adams, Amite, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Claiborne, Clarke, Clay, Copiah, Desoto, Forrest, Franklin, George, Greene, Hancock, Harrison, Hinds, Humphreys, Jackson, Jasper, Jefferson, Jones, Lafayette, Lamar, Lawrence, Lee, Lincoln, Lowndes, Madison, Marion, Marshall, Monroe, Montgomery, Neshoba, Newton, Noxubee, Panola, Pearl River, Perry, Pike, Pontotoc, Prentiss, Quitman, Scott, Sharkey, Simpson, Smith, Stone, Tallahatchie, Tate, Tippah, Tishomingo, Union, Warren, Washington, Wayne, Webster, Winston, Yalobusha.

Very common, occurs statewide; habitat includes a variety of temporary or permanent, grassy or otherwise vegetated, lentic or slowly flowing water bodies.

Ischnura kellicotti Williamson

4 March–4 August; Lago et al., 1979; Alcorn, Choctaw, Greene, Harrison, Kemper, Lamar, Lawrence, Leake, Marion, Stone, Tishomingo.

To date known from scattered localities in the eastern half of the state. Inhabits ponds, lakes, and stream backwaters with floating aquatic vegetation, almost always including water lilies.

Ischnura posita (Hagen)

29 February–27 September; Lago et al., 1979; Adams, Alcorn, Amite, Attala, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Choctaw, Claiborne, Clarke, Clay, Coahoma, Copiah, Covington, Desoto, Forrest, Franklin, Greene, Grenada, Hancock, Harrison, Hinds, Holmes, Humphreys, Issaquena, Itawamba,

Jackson, Jasper, Jefferson, Jefferson Davis, Jones, Kemper, Lafayette, Lamar, Lauderdale, Lawrence, Leake, Lee, Leflore, Lowndes, Madison, Marion, Marshall, Monroe, Montgomery, Neshoba, Noxubee, Panola, Pearl River, Perry, Pike, Pontotoc, Prentiss, Quitman, Rankin, Scott, Sharkey, Simpson, Smith, Stone, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Union, Walthall, Warren, Washington, Wayne, Webster, Wilkinson, Winston, Yalobusha, Yazoo.

Probably the most commonly encountered damselfly in Mississippi; occurs statewide at a variety of habitats.

Ischnura prognata (Hagen)

12 April–18 July; Bried, 2002; Holmes, Jefferson, Jones, Monroe, Winston.

Probably occurs in scattered, localized populations across the state, but seldom seen due to its secretive nature. Typical habitat includes forested swamp margins and seepage drains.

Ischnura ramburii (Selys)

14 February–23 December; Richmond, 1962; Adams, Attala, Bolivar, Carroll, Choctaw, Claiborne, Clarke, Copiah, Covington, Forrest, Greene, Grenada, Hancock, Harrison, Issaquena, Jackson, Jasper, Jefferson Davis, Jones, Lamar, Lawrence, Leake, Leflore, Lincoln, Lowndes, Madison, Marion, Marshall, Neshoba, Noxubee, Pearl River, Perry, Pike, Pontotoc, Rankin, Scott, Simpson, Sunflower, Tallahatchie, Tate, Tippah, Walthall, Warren, Washington, Webster, Wilkinson, Winston, Yazoo.

Occurs throughout the state, but seems to be less common across the northern tier of counties. Inhabits ponds and lakes, found less often at slow flowing streams. Often extremely abundant around catfish ponds.

Nehalennia gracilis Morse

29 May–7 June; Westfall & May, 1996; Marshall.

To date known from only one locality in extreme northern Mississippi; should occur elsewhere in the state. Apparently restricted to spring fed seepage drains and ditches, and the boggy margins of spring fed beaver ponds, in the southeast portion of its overall range.

Nehalennia integricollis Calvert

17 April–19 September; Lago et al., 1979; Adams, Choctaw, George, Jackson, Jefferson Davis, Lamar, Marion, Marshall, Stone, Winston.

Uncommonly seen, but has been collected at widely scattered localities in all portions of the state. Additional collecting around the margins of grassy ponds, lakes, and beaver flows should result in additional records for this tiny species.

Telebasis byersi Westfall

26 May–4 August; Bried, 2002; Adams, Holmes, Issaquena, Leake, Leflore, Sharkey, Tallahatchie, Washington.

A recent addition to the documented Mississippi fauna; fairly common at vegetated oxbow lakes and sloughs in the western part of the state, particularly those with floating duckweed mats.

ANISOPTERA

PETALURIDAE

Tachopteryx thoreyi (Hagen)

6 April–24 June; Dunkle, 1975; Calhoun(N), Holmes, Perry, Stone, Tippah, Tishomingo.

Likely quite rare in Mississippi, especially in the northwest part of the state, due to a lack of its breeding habitat (forested spring-fed seepage areas).

AESHNIDAE

Aeshna umbrosa Walker

10 October–8 November; Bick, 1950; Alcorn, Lafayette, Quitman.

Restricted to the northern part of the state and probably quite rare, at beaver ponds, woodland streams, and similar habitats.

Anax junius (Drury)

31 March–8 November; Bick, 1950; Adams, Amite, Bolivar, Calhoun, Claiborne, Coahoma, Copiah, Forrest, George, Greene, Grenada, Hancock, Harrison, Hinds, Issaquena, Jackson, Jasper(N), Kemper, Lafayette, Lamar, Lee, Madison, Marion, Marshall, Montgomery, Oktibbeha, Pearl River, Prentiss, Stone, Sunflower, Tate, Tishomingo, Warren, Washington, Wayne, Yazoo.

Very common, occurring throughout the state and expected in all counties. The absence of records for this species from much of eastern Mississippi is most likely due to lack of collecting effort. Breeding habitat includes a variety of ponds, marshes, and other lentic habitats, but adults of this migrant

(Russell et al., 1998) may be found almost anywhere.

Anax longipes Hagen

25 May–19 September; Davis, 1914; Adams, Chickasaw, George, Harrison, Jackson, Lafayette(N), Marion, Stone.

Probably occurs in small, widely scattered, local populations across the state; habitat is small, vegetated ponds and shallow abandoned quarry pits, most often without fish.

Basiaeschna janata (Say)

23 March–16 May; Westfall, 1952; Itawamba(N), Lafayette, Lauderdale, Lawrence, Marshall(N), Noxubee, Pike, Tishomingo(N), Walthall, Winston.

Early season species that should be found in most counties, at least across the southern and eastern portions of the state, where suitable habitat includes small to large, clear flowing streams and occasionally ponds or lakes.

Boyeria vinosa (Say)

9 June–28 September; Bick, 1950; Amite, Calhoun(N), Covington(N), Franklin(N), George, Hancock, Itawamba(N), Jefferson Davis(N), Lafayette, Lamar, Lauderdale, Lincoln, Lowndes, Marion(N), Marshall(N), Panola(N), Pearl River, Perry, Pike(N), Simpson(N), Stone(N), Tishomingo, Warren, Wayne.

Widespread throughout the state, but not commonly collected as adults; inhabits flowing streams and rivers. The low, darting, mainly crepuscular flight habits and drab brown coloration make netting this species difficult.

Coryphaeschna ingens (Rambur)

20 May–14 August; Bick, 1950; Alcorn, Hancock, Holmes, Jackson(N), Lafayette(N), Lamar, Leake(N), Marshall(N).

Few scattered records across the state including, somewhat surprisingly, a couple from the extreme north. Habitat includes heavily vegetated ponds and swamps.

Epiaeschna heros (Fabricius)

19 March–15 November; Bick, 1950; Adams, Alcorn, Bolivar, Choctaw, Copiah, Forrest, George, Grenada, Hancock, Harrison, Hinds, Holmes, Itawamba, Jackson, Jasper, Jones, Lafayette, Lawrence, Monroe, Neshoba, Newton, Noxubee, Oktibbeha, Pearl River, Perry, Pike, Pontotoc, Rankin, Sharkey, Smith, Tallahatchie, Tate, Tippah, Tishomingo(N), Warren, Washington, Wayne, Wilkinson.

Common, found throughout the state; probably occurs in every county. Breeding habitat includes forested swamps and smaller woodland pools, and adults are often found away from water, cruising along dirt roads or swarming to feed on small winged insects (Bried, 2003).

***Gomphaeschna antilope* (Hagen)**

8 April–24 May; Westfall, 1952; Forrest, George, Hancock, Perry, Pike, Stone.

Uncommon, probably restricted to the southern half of the state; adults are usually found along dirt roads or other openings in forest near swamps.

***Gomphaeschna furcillata* (Say)**

1 March–21 April; Westfall, 1952; George, Lafayette, Marshall(N), Neshoba, Noxubee, Perry, Pike, Stone, Tishomingo, Winston.

Slightly more common in the state than *G. antilope*, in the same habitat, and ranges more to the north.

***Nasiaeschna pentacantha* (Rambur)**

17 April–14 August; Bick, 1950; Adams(N), Bolivar, Choctaw, Clay, Coahoma, Holmes, Humphreys, Lafayette(N), Lauderdale, Leake, Leflore(N), Noxubee, Oktibbeha, Sharkey, Warren, Washington, Winston.

Fairly common, probably will be found north and south of existing records. Habitat includes swamps, sloughs, sluggish streams, and oxbow lakes, where the nymphs cling to submerged wood.

GOMPHIDAE

***Aphylla angustifolia* Garrison**

6 August; Mauffray, 1999; Wilkinson.

Record based on one specimen housed in the Louisiana State Collection of Arthropods, as reported by Mauffray (1999). The species appears to be expanding its range slightly to the east, so it is possible that it may also occur in other southwest counties.

***Aphylla williamsoni* (Gloyd)**

29 May–20 September; Bick, 1990; Attala, Choctaw, Clay, Covington, Harrison, Hinds, Jackson, Jasper(N), Jones, Kemper, Lawrence, Leake, Lowndes, Marion, Monroe, Montgomery, Perry, Simpson, Stone(N), Wayne, Winston.

Found across much of the southern and eastern parts of the state. Its ability to colonize man-made habitats such as fishing lakes and subdivision ponds has apparently allowed it to expand its range to the north.

***Arigomphus lentulus* (Needham)**

17 May–9 June; Bried & Krotzer, 2005; Oktibbeha.

Known only from two neighboring farm ponds just outside the city of Starkville in eastern Mississippi. Adults have been observed in multiple years, and nymphs have been collected in one pond, indicating that a permanent, reproducing population exists here. The species is at the eastern periphery of its range in the state, and other populations, if they exist, are likely to be few.

***Arigomphus maxwelli* (Ferguson)**

26 April–4 June; Dunkle, 1983; Grenada, Holmes, Humphreys, Leflore, Quitman, Sharkey, Tallahatchie, Winston.

Seldom encountered; known from a handful of counties mostly in the western part of the state. Likely to be somewhat more common than current records indicate, and populations are probably scattered across the state in the appropriate habitat, which is generally mature hardwood swamps with some flow.

***Arigomphus submedianus* (Williamson)**

20 May–30 July; Westfall, 1952; Adams, Bolivar, Grenada, Holmes, Humphreys, Issaquena, Lafayette, Leflore, Oktibbeha, Pontotoc, Quitman, Sharkey, Sunflower, Tallahatchie, Tate, Tunica, Washington, Yalobusha, Yazoo.

The most encountered member of the genus, occurring fairly commonly in the western portion of Mississippi; local in the north and east, but not yet found in the southeastern quarter of the state. Habitat includes a variety of muddy ponds, oxbow lakes, and sloughs.

***Arigomphus villosipes* (Selys)**

29 May–8 July; Donnelly, 2004a; Marshall, Tippah.

Rare in the state, restricted to the extreme northern counties. Habitat is usually open muddy margins of ponds. Originally reported from the state based on nymphal material (Stanford & Lago, 1981), probably in error, and not included here. First collected as adults in Mississippi by JB and reported by Donnelly (2004a).

***Dromogomphus armatus* Selys**

25 May–1 July; Needham, Westfall & May, 2000; Forrest, Greene, Harrison, Lamar, Marion, Pearl River, Perry(N), Stone.

To date, records for this rarely found species are restricted to the extreme southeast corner of the state; unlikely to be found very far to the north or west of existing range. Habitat is usually small, forested streams with flow over organic “muck” substrate; SK has seen adults and collected nymphs at ponds in Alabama and Georgia, but always with very soft, organic substrate.

***Dromogomphus spinosus* Selys**

24 May–4 August; Bick, 1950; Amite(N), Benton, Clay, Copiah, Covington(N), Forrest, Itawamba, Jefferson Davis(N), Lafayette(N), Lauderdale, Leake, Lowndes, Marshall(N), Monroe, Newton, Pearl River, Pike, Simpson, Smith, Stone, Tishomingo, Warren, Wayne, Winston.

Very common in the eastern half of the state, less so in the west and along the coast; probably occurs in most counties. An opportunist that occurs in a variety of habitats including small to large streams, rivers, ponds, and large reservoirs.

***Dromogomphus spoliatus* (Hagen)**

18 July–30 August; Bried, 2002; Desoto, Itawamba, Kemper, Lafayette, Marshall, Monroe, Tallahatchie, Tishomingo, Winston.

Apparently restricted to the northern half of the state, where it occurs along sluggish rivers, reservoirs, lakes, and ponds.

***Erpetogomphus designatus* Hagen**

28 May–7 July; Stanford & Lago, 1981; Clay, George, Lauderdale, Lawrence, Lowndes(N), Newton, Pike(N), Smith, Webster(N).

Currently known from a few counties mainly in the southern and eastern parts of the state. Likely to be rare or absent from most of the west, due to lack of suitable habitat, namely streams and rivers that flow over sand/gravel substrates.

***Gomphus (Gomphurus) dilatatus* Rambur**

11 June–23 June; Bick, 1990; Lauderdale, Newton.

Near the western edge of its range in eastern Mississippi, most likely rare in the state; usually found along medium to large, often silty, streams and rivers.

***Gomphus (Gomphurus) hybridus* Williamson**

7 April–26 June; Westfall, 1952; Benton, Claiborne(N), George, Greene, Hancock, Lawrence, Marion, Panola, Perry, Webster(N).

Uncommonly encountered, with most records to date concentrated in the southeastern portion of the state; will probably be found in other counties, along large streams and rivers with a silt or silt/sand substrate.

***Gomphus (Gomphurus) modestus* Needham**

25 April–1 July; Needham, 1942; Benton, George, Hancock, Harrison, Itawamba(N), Jones(N), Lafayette, Lauderdale, Lincoln, Newton, Pearl River, Pike, Stone, Tippah(N).

Undoubtedly more common in the state than current records indicate; both adults and nymphs can be very difficult to find. The preferred habitat is often given as medium to large silty streams and rivers (Tennesen et al., 1995); we have also found the species on several occasions at smaller, tannin-stained, sandy streams.

***Gomphus (Gomphurus) vastus* Walsh**

8 April–25 July; Westfall, 1952; George, Issaquena, Lauderdale, Newton, Rankin.

Found to date in a few counties in the southern half of the state; should occur in scattered localities farther north, along medium to large streams and rivers. As with many species of *Gomphus*, its relatively short flight season, somewhat secretive nature, and specific habitat requirements cause it to be substantially underrepresented in collections.

***Gomphus (Gomphus) australis* (Needham)**

10 April–22 April; Bick, 1990; Stone.

Presently known from one county in Mississippi. Should occur in other counties as well, but is almost certainly limited to the southern portion of the state. Preferred habitat is permanent, vegetated ponds.

***Gomphus (Gomphus) exilis* Selys**

11 March–14 June; Bick, 1950; Alcorn, Amite, Benton, Carroll, Chickasaw, Choctaw, Copiah, Forrest, Franklin, George, Greene, Grenada, Hancock, Harrison, Hinds, Jackson, Jasper, Jones, Kemper, Lafayette, Lamar, Lauderdale, Marion, Marshall, Neshoba, Noxubee, Oktibbeha, Pearl River, Perry, Pike, Pontotoc, Rankin, Scott, Simpson, Smith, Stone, Tippah, Union, Wayne, Winston, Yalobusha, Yazoo.

One of the most common gomphids in the state; possibly occurs in every county, although no records yet exist from any of the counties bordering the Mississippi River at the extreme western edge of the state. Habitat includes a variety of water bodies including ponds, small to large streams, rivers, and reservoirs.

Gomphus (Gomphus) hodgesi Needham

1 March–7 May; Westfall, 1952; George, Greene, Hancock, Perry, Stone.

Rarely encountered and limited to the extreme southeastern corner of the state. Habitat for this diminutive species is small, clean, flowing, sandy forested streams.

Gomphus (Gomphus) lividus Selys

11 March–24 May; Westfall, 1952; Amite, Choctaw, Claiborne, Copiah, Forrest, Franklin, Hancock, Hinds, Kemper, Lafayette, Lamar, Lawrence, Lincoln, Newton, Panola(N), Perry, Pike, Prentiss(N), Simpson, Smith, Stone, Tishomingo, Walthall, Winston, Yalobusha(N).

Common, especially in the southwest section of the state. Should be found in many more counties, early in the flight season along forested streams and rivers of varying size and water quality.

Gomphus (Hylogomphus) apomyius Donnelly

25 March–17 May; Dunkle, 1975; Amite, Claiborne(N), Forrest, Itawamba(N), Lauderdale, Marion, Pike, Stone, Tippah(N), Tishomingo.

Should be found in additional counties, but easily overlooked due to small size and early flight season. Preferred habitat is small to medium streams and larger rivers, with a sand/gravel substrate.

Gomphus (Hylogomphus) geminatus Carle

26 March–12 April; New State Record; Stone.

Reported based on an emerging male, with exuviae, collected by MJK in 2006 at a small, tannic stream with eelgrass and other submerged aquatic vegetation, within the De Soto National Forest. Several mature adults were collected from the same stream during 2007. Although probably quite rare, *G. geminatus* could occur in scattered, local populations in other counties in the southeastern part of the state. This record represents a slight western range extension for the species.

Hagenius brevistylus Selys

25 May–10 October; Westfall, 1952; Covington, George, Hancock, Itawamba(N), Lamar, Lauderdale, Lincoln, Monroe, Perry, Pike, Tishomingo, Wayne, Winston.

Should occur statewide, wherever suitable habitat (flowing streams and rivers) exists.

Ophiogomphus australis Carle

1 April–21 April; Carle, 1992; Pike.

Known historically in Mississippi only from the upper Tangipahoa River, just north of the Mississippi/Louisiana border, where it has been documented as recently as 2006. Habitat for this species, clean, flowing streams with a stable gravel substrate, has been dramatically altered by gravel mining operations and other land use changes.

Several nymphs belonging to the *Ophiogomphus incurvatus* species complex, which includes *O. australis*, were collected by SK in 2007 at a medium, forested sand/gravel stream in Itawamba Co., in the northeast part of the state. The nymphs key to *O. australis* (K.J. Tennessen, personal communication), although this would be a significant northern extension of the range. It is possible they are *O. incurvatus* or an undescribed species belonging to the *O. incurvatus* complex. Adult specimens are needed in order to confirm the identity of this population.

Progomphus obscurus (Rambur)

10 April–30 August; Bick, 1950; Alcorn(N), Amite(N), Attala, Benton, Calhoun, Carroll, Choctaw, Claiborne, Clay, Copiah, Forrest, Franklin, George, Grenada, Hancock, Harrison, Holmes, Itawamba(N), Jackson, Jefferson, Jefferson Davis(N), Kemper, Lafayette, Lamar, Lauderdale, Lawrence, Leake, Lincoln, Marion, Marshall, Newton, Noxubee(N), Panola(N), Pearl River, Perry, Pike, Pontotoc, Prentiss(N), Scott, Simpson, Smith, Stone, Tippah, Union, Walthall, Warren, Wayne, Wilkinson, Yalobusha(N), Yazoo.

Very common, probably occurs in most counties along sandy streams and rivers.

Stylogomphus albistylus (Hagen)/***sigmastylus*** Cook & Lauder milk

17 May; Stanford and Lago, 1981; Itawamba(N), Tippah(N), Tishomingo(N).

Known only from nymphs/exuviae collected in the northeast portion of the state, and its distribution is probably lim-

ited to that area. Adults are needed to confirm whether the species occurring in Mississippi is *S. albistylus* or the closely related, recently described *S. sigmastylus* (Cook & Lauder-milk, 2004); the ranges of these two species meet very near the locality from which these nymphs were taken. The typical habitat for the two species is similar and comprises clean, small to medium, forested streams with moderate flow and a combination of sand, gravel, and rocky substrate.

Stylurus laurae (Williamson)

17 May–6 July; Westfall, 1952; Itawamba(N), Lafayette, Lamar, Lawrence, Marion, Pearl River, Pike(N), Prentiss(N), Simpson, Stone, Tippah, Tishomingo, Wayne.

This elusive species is probably more common in the state than current records indicate. Most records are from small to medium, sandy, forested streams.

Stylurus plagiatus (Selys)

27 May–5 October; Donnelly, 2004a; Benton, Claiborne, Covington, Desoto, Hancock, Issaquena, Lafayette, Leake, Pearl River, Sharkey, Stone, Sunflower, Tate, Wayne, Yazoo.

Most commonly encountered member of the genus; probably occurs in most counties. Adaptable species that can be found along medium to large streams, rivers, and around large lakes and reservoirs.

Stylurus potulentus Needham

22 June–6 July; Needham, 1942; George, Greene, Jackson, Pearl River, Perry.

Rare, known from only a handful of scattered localities throughout its range, mostly in Florida and Mississippi. Undoubtedly restricted to the southeast corner of the state, where it inhabits very clean, forested, shallow sandy streams.

Stylurus townesi Gloyd

16 June–6 July; Needham, Westfall & May, 2000; George, Jackson, Pearl River, Wayne.

Another rare gomphid, known from very few localities over-all or in Mississippi, where it is limited to the southeastern corner of the state. Habitat is small to medium, clean, shallow sandy streams flowing through forest.

CORDULEGASTRIDAE

Cordulegaster bilineata Carle

20 March–25 April; Westfall, 1952; Calhoun(N), Franklin, George, Lafayette, Marshall(N).

Early literature records of *C. diastatops* from the state should be attributed to this species (Carle, 1983), which is apparently quite rare and localized. Breeding habitat is sandy to boggy, spring-fed seepages and first order trickles through forest. Adult males may often be found cruising dirt roads and other openings in the forest near the breeding habitat.

Cordulegaster erronea Hagen

Unknown; Stanford & Lago, 1981; Calhoun(N), Lafayette(N).

Historically known from Mississippi from a single nymphal record (Stanford & Lago, 1981); this specimen was deposited at UM. The senior author has recently discovered additional material in the form of two half-grown nymphs (misidentified as *C. bilineata*), also in the UM collection. Dr. Kenneth J. Tennessen has confirmed the identity of these three specimens. To date, no confirmed adult records exist for the species, and the historical localities of the above nymphal records have been greatly altered since their collection, at least for the Calhoun Co. records (Paul Lago, personal communication). The species, though undoubtedly rare and local, probably still occurs in the northern half of the state where appropriate habitat—small, sandy, undisturbed first-order forest streams, remains intact.

Cordulegaster maculata Selys

19 March–18 April; Bick, 1950; Amite, Itawamba (N), Lafayette(N), Lawrence, Perry, Pike, Simpson, Stone, Tishomingo(N), Wilkinson(N).

Current records exist only from the southern third of the state, but this species should be found farther to the north, at least in the eastern portion of Mississippi. Prefers sandy streams and rivers of varying sizes, usually forested.

Cordulegaster obliqua (Say)

14 May–28 May; Stanford and Lago, 1981; Holmes, Lamar, Marshall(N), Perry, Simpson, Smith, Winston, Yalobusha.

Another uncommon and local species, with records scattered around the state. The preferred habitat is tiny, forested sandy trickles and streams.

MACROMIIDAE

Didymops transversa (Say)

26 March–18 May; Bick, 1950; Adams, Claiborne, Desoto(N), George, Hancock, Hinds, Jones, Kemper, Lafayette, Lamar, Lauderdale, Lawrence, Marion(N), Neshoba, Noxubee, Oktibbeha, Panola(N), Pike, Smith, Stone, Tishomingo, Walthall, Warren, Wayne, Winston.

Common, expected to occur throughout the state. Streams and small rivers seem to be the preferred habitat, although the species may also be found at ponds and lakes.

Macromia alleghaniensis Williamson

23 May–15 July; Needham, Westfall & May, 2000; Forrest, Kemper, Stone, Wayne.

Known from only a handful of records in Mississippi; probably more common than this, especially in the eastern part of the state. Breeding habitat is small to medium, high quality forested streams; may also be found hawking for prey along dirt roads and other forest openings near the breeding habitat.

Macromia illinoiensis Walsh

15 June–18 September; Bick, 1950; Amite(N), Carroll, Chickasaw, Clay, Coahoma, Covington(N), George, Hinds, Holmes(N), Jefferson Davis(N), Kemper, Lafayette, Leake, Lee, Lowndes, Monroe, Montgomery, Newton(N), Oktibbeha, Perry, Pike(N), Stone, Tishomingo, Warren, Wayne.

Common, expected to occur throughout the state. Most, if not all, specimens from Mississippi are of the subspecies *georgina* (Donnelly & Tennessen, 1994), although individuals from the extreme northeast corner of the state might be assignable to the subspecies *illinoiensis*, or might possess characters that are intermediate in nature. Habitat includes small to large streams and rivers; individuals, especially males, are often found along openings in the forest away from the water.

Macromia taeniolata Rambur

5 May–30 August; Bick, 1950; Benton, Chickasaw, Choctaw, Clarke, Clay, George, Hancock, Itawamba, Kemper, Lafayette, Leflore, Lowndes, Marshall, Noxubee, Pearl River, Pike, Scott, Tallahatchie, Tishomingo, Warren, Webster(N).

Perhaps the most commonly encountered member of the genus in Mississippi; should be found in every county. Preferred habitat seems to be large streams and rivers, but may also be found around larger ponds, lakes, and reservoirs. As

with other *Macromia*, often found cruising along openings away from the breeding habitat.

CORDULIIDAE

Epitheca (Epicordulia) princeps Hagen

21 May–27 July; Bick, 1950; Adams, Chickasaw, Clay, George, Grenada, Holmes, Humphreys, Issaquena, Itawamba, Jackson, Jasper, Lafayette, Lee(N), Leflore, Lowndes, Noxubee, Oktibbeha, Pontotoc, Quitman, Sharkey, Smith, Tallahatchie, Tishomingo, Tunica, Union, Warren, Wilkinson, Winston.

Common, probably occurs statewide; adult males may be seen patrolling along the shoreline of ponds, lakes, reservoirs, oxbow sloughs, and pooled areas of large streams and rivers.

Epitheca (Tetragoneuria) costalis (Selys)

26 March–26 June; Westfall, 1952; Alcorn, Desoto, Franklin, George, Hinds, Jasper, Kemper, Marshall, Noxubee, Prentiss, Tippah, Union, Yalobusha.

Apparently uncommon in the state, although it is probably more widespread than current records indicate. Most often found around ponds and small lakes; may also occur along pooled areas of slowly flowing streams.

Epitheca (Tetragoneuria) cynosura (Say)

1 March–12 July; Bick, 1950; Adams, Benton, Choctaw, Claiborne, Forrest, Franklin, George, Greene, Hancock, Hinds, Jackson, Jasper, Jones, Kemper, Lafayette, Lamar, Lauderdale, Lee, Lincoln, Madison, Marion, Marshall, Neshoba, Noxubee, Oktibbeha, Pearl River, Perry, Pike, Scott, Stone, Tishomingo, Wayne, Winston.

Very common in Mississippi, likely to be found in any county. Habitat includes a variety of ponds, lakes, swamps, and sloughs, as well as marshy stream pools. The late flight date of 12 July (Bick, 1950) is likely an anomaly, as it falls well outside of the usual flight season for the species in the South.

Epitheca (Tetragoneuria) spinosa (Hagen)

6 April; New State Record; Claiborne.

Based on a single female (previously misidentified as *E. cynosura*) located in the MMNS collection. Very few records exist for this species from the southeastern US, probably due to the very early and brief flight season and the dwindling, localized nature of the breeding habitat of wooded swamps and oxbow sloughs with some, but little, current.

Helocordulia selysii (Hagen)

19 March–1 May; Bick, 1950; Amite, Clarke, George, Lincoln, Perry, Pike, Simpson, Stone, Tishomingo, Winston.

Uncommon, apparently more often encountered in the southern half of the state; found along small, forested streams with sandy substrates and high water quality, where nymphs cling to submerged roots and other woody debris along the margins of the stream.

Neurocordulia alabamensis Hodges

Unknown; New State Record; Itawamba(N), Marion(N), Perry(N), Simpson(N), Stone(N).

Record based on several lots of nymphs from the southern part of the state, discovered by SK in the UM collection. We also collected nymphs from small, tannic streams in the De Soto National Forest in southern Mississippi and from a larger stream in the northeastern portion of the state during 2006 and 2007. Adults of this genus fly at or just prior to dusk, so they are probably more common than records would indicate. The nymphs are usually found clinging to submerged woody debris or root masses.

Neurocordulia molesta (Walsh)

9 May–21 July; Needham, Westfall & May, 2000; Bolivar, Forrest, Hancock, Harrison, Issaquena, Lowndes, Stone.

Found at scattered localities around the state, where it inhabits larger rivers and, less often, medium streams.

Neurocordulia virginienensis Davis

31 May–29 June; Bick, 1950; Amite(N), Covington(N), Hancock, Itawamba(N), Lafayette(N), Marion(N), Newton, Pearl River, Perry, Tishomingo(N), Wilkinson(N).

Records scattered across several counties; probably occurs in additional localities with appropriate habitat, which is generally thought to be medium to large streams and small rivers, often rocky, where nymphs cling to rocks or woody debris in the stream.

Neurocordulia yamaskanensis (Provancher)

Unknown; Donnelly, 2004b; Tishomingo.

Reported for the state by Donnelly (2004), based on specimens examined by SK from a private collection. The date of collection was not recorded and the specimens have since been lost. The specimens were collected from the extreme

northeast corner of the state, and the range of the species in Mississippi is undoubtedly limited to this area, where it may be found in the large impoundment reservoirs associated with the Tennessee River.

Somatochlora filosa (Hagen)

4 July–12 October; Westfall, 1952; Covington, Forrest, George, Hancock, Wayne.

Current records indicate that this uncommon species is limited to the southern part of the state; its overall distribution suggests that additional populations should exist farther to the north, especially along the Mississippi/Alabama border. Oviposition has been observed along a forested seepage stream margin (Beaton & Stevenson, 2006). Adults are most often found hawking for prey over forested sand roads or other openings.

Somatochlora georgiana Walker

29 June–12 August; Dunkle, 1983; George, Jackson, Stone, Wayne.

Rarely encountered, found only in the southeast portion of the state; collected as recently as 2006 (Stone Co., MJK). Breeding habitat has been described as pool areas of slowly flowing, tannic, forested streams (Daigle, 1994).

Somatochlora linearis (Hagen)

22 June–8 September; Bick, 1950; Carroll, Clay, George, Hancock, Itawamba, Jefferson, Monroe, Tishomingo, Wayne, Wilkinson, Winston.

Probably the most commonly occurring member of the genus in Mississippi; found throughout the state along small, woodland, temporary or permanent streams.

Somatochlora provocans Calvert

22 June–24 August; Westfall, 1952; Copiah, Forrest, Hancock, Kemper, Newton, Tishomingo, Winston.

Uncommonly encountered in Mississippi; ranges across the state from north to south, but is probably absent from the upper Delta. As with many members of the genus, adults are most often seen away from the breeding habitat (small, forested, spring runs), hawking along dirt roads or in openings in the forest.

Somatochlora tenebrosa (Say)

26 June–20 September; Westfall, 1952; Calhoun, Chickasaw, Clay, Grenada, Lafayette, Marshall, Stone, Tishomingo.

Recorded mainly from the northeast portion of the state, where it may be fairly common; a recent record (2006, SK) from Stone Co. has extended the range well to the south. Typical habitat is small, forested streams, but adults are usually encountered away from the water along forest openings.

LIBELLULIDAE

Brachymesia gravida (Calvert)

28 May–6 September; Westfall, 1952; Clay, Hancock, Hinds, Jackson, Jasper, Jefferson Davis, Lowndes, Oktibbeha, Perry, Smith, Tallahatchie, Washington.

Undoubtedly more common than current records indicate, *B. gravida* is often found in large numbers around brackish or mineralized ponds across the state.

Celithemis amanda (Hagen)

11 April–19 September; Westfall, 1952; George, Greene, Hancock, Harrison, Marion, Perry, Stone.

Uncommonly encountered in the state, probably restricted to the southernmost counties. Typical habitat includes small, vegetated pond margins.

Celithemis bertha Williamson

19 September; Confirmed State Record; Marion.

Listed as occurring in Mississippi by Needham, Westfall and May (2000), apparently based on the presence of one specimen in the FSCA. The senior author has examined this specimen, an immature male, and determined it to be *C. ornata* rather than *bertha*. No other records of *C. bertha* from the state could be located, leaving its status in question. The species' occurrence in Mississippi has been confirmed during the present study by the collection of two males by SK during 2007. Habitat was typical for the species, which prefers sandy ponds with some emergent shoreline vegetation. *C. bertha* should occur at other similar habitats in the southeastern portion of the state.

Celithemis elisa (Hagen)

22 March–6 November; Bick, 1950; Alcorn, Benton, Calhoun, Clay, Forrest, Franklin, Hancock, Harrison, Hinds, Jasper, Lafayette, Lamar, Lee, Lowndes, Marion, Marshall, Monroe, Noxubee, Oktibbeha, Pontotoc, Prentiss, Rankin, Scott, Simpson, Smith, Stone, Tippah, Tishomingo, Walthall, Wayne, Yalobusha.

Probably the most often encountered member of the genus in Mississippi; found throughout the state, with the possible exception of the upper Delta. Inhabits a variety of natural

or man-made lentic waters, including farm ponds and borrow pits.

Celithemis eponina (Drury)

19 May–30 August; Bick, 1950; Attrala, Calhoun, Chickasaw, Choctaw, Clay, Franklin, George, Hancock, Hinds, Itawamba, Jackson, Jasper, Jones, Kemper, Lee, Lowndes, Madison, Monroe, Noxubee, Oktibbeha, Rankin, Simpson, Sunflower, Tallahatchie, Tate, Tishomingo, Washington.

Common, found throughout the state. Habitat includes man-made ponds and small lakes, as well as natural marshy ponded areas. Adults are often found in large numbers in fields away from the breeding habitat (Bried & Ervin, 2006).

Celithemis fasciata Kirby

17 May–19 September; Bick, 1950; Adams, Alcorn, Calhoun, Choctaw, Copiah, Desoto, George, Greene, Hancock, Harrison, Hinds, Itawamba, Jackson, Kemper, Lafayette, Lamar, Leake, Lee, Marion, Marshall, Monroe, Montgomery, Neshoba, Pearl River, Pike, Stone, Tishomingo, Union, Webster, Winston.

Another common member of the genus that has been found in all portions of the state except the upper Delta; likely occurs there, also. Inhabits a variety of man-made and natural ponds and lakes.

Celithemis ornata (Rambur)

5 April–3 July; Westfall, 1952; George, Hancock, Jackson, Perry, Stone.

Uncommon, with an earlier flight season than most members of the genus; apparently restricted to southern portion of state. Found around the margins of small ponds, especially those containing abundant shoreline vegetation.

Celithemis verna Pritchard

10 April–16 June; Dunkle, 1975; Choctaw, Forrest, Jackson, Stone.

Perhaps the least common member of the genus in Mississippi; likely occurs in small, localized populations across the state. Typical breeding habitat is small ponds with emergent vegetation.

Dythemis velox Hagen

17 June–7 September; Westfall, 1952; Chickasaw, Clay, Copiah, Franklin, Hinds, Itawamba, Kemper, Lafayette, Oktibbeha, Pike, Wayne, Webster, Wilkinson, Winston.

Fairly common, probably occurs across much of the state. Breeding habitat includes lakes (including large, man-made reservoirs), ponds, and sluggish portions of streams and large rivers.

Erythemis simplicicollis (Say)

2 April–19 October; Bick, 1950; Adams, Alcorn, Amite, Attala, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Choctaw, Claiborne, Clarke, Clay, Coahoma, Copiah, Covington, Desoto, Forrest, Franklin, George, Greene, Grenada, Hancock, Harrison, Hinds, Holmes, Humphreys, Issaquena, Itawamba, Jackson, Jasper, Jefferson, Jefferson Davis, Jones, Kemper, Lafayette, Lamar, Lauderdale, Lawrence, Leake, Lee, Leflore, Lincoln, Lowndes, Madison, Marion, Marshall, Monroe, Montgomery, Neshoba, Newton, Noxubee, Oktibbeha, Panola, Pearl River, Perry, Pike, Pontotoc, Prentiss, Quitman, Rankin, Scott, Sharkey, Simpson, Smith, Stone, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Union, Walthall, Warren, Washington, Wayne, Webster, Wilkinson, Winston, Yalobusha, Yazoo.

Perhaps the most common species of dragonfly in the state; has been collected in every county. Found around a wide variety of lentic habitats.

Erythrodiplax berenice (Drury)

18 April–23 October; Borror, 1942; Hancock, Harrison, Jackson.

One of the few species of North American odonates capable of breeding in brackish or salt water; restricted to the Mississippi Gulf Coast around wet, grassy areas in or adjacent to salt marsh habitat.

Erythrodiplax minuscula (Rambur)

6 April–6 November; Wright, 1937; Amite, Carroll, Clarke, Clay, Copiah, Forrest, George, Greene, Hancock, Harrison, Hinds, Jackson, Jones, Kemper, Lafayette, Lamar, Marion, Marshall, Neshoba, Pearl River, Perry, Scott, Stone, Walthall, Wayne.

Expected to occur throughout Mississippi; no records to date from counties in the Delta. Found around ponds, beaver swamps, lakes, and slow moving streams.

Erythrodiplax umbrata (Linnaeus)

Unknown; Donnelly, 2004b; Harrison.

Reported for the state by Donnelly (2004), based on specimens examined by SK from a private collection. The date of collection was not recorded and the specimens have since been lost. Typical habitat includes temporary or permanent ponds or marshy pools.

Ladona deplanata (Rambur)

8 March–20 May; Bick, 1950; Alcorn, Choctaw, Clarke, Copiah, Forrest, Franklin, George, Greene, Harrison, Hinds, Jackson, Jefferson, Jones, Kemper, Lafayette, Lamar, Lawrence, Marion, Marshall, Neshoba, Noxubee, Perry, Pike, Rankin, Scott, Smith, Stone, Tippah, Tishomingo, Union, Warren, Wayne, Winston, Yalobusha.

Very common early season species expected to occur statewide at a variety of lentic habitats, including man-made ponds and lakes, beaver swamps, and oxbow lakes.

Libellula auripennis Burmeister

9 May–19 September; Westfall, 1943; Calhoun, Franklin, George, Greene, Hancock, Harrison, Jackson, Lamar, Marion, Marshall, Oktibbeha, Pearl River, Perry, Stone.

Found in north and south Mississippi but not yet collected from middle of state. Probably more common in the south. Habitat includes ponds, marshes, and slowly flowing, vegetated streams.

Libellula axilena Westwood

8 April–27 August; Bick, 1950; Amite, Clay, Forrest, George, Hancock, Harrison, Jackson, Oktibbeha, Pearl River, Stone.

Distribution in the state probably similar to that of *L. auripennis*; not yet documented from extreme northern counties. Typical breeding habitat is small, forested swamp pools and sloughs.

Libellula cyanea Fabricius

17 April–25 July; Bick, 1950; Alcorn, Choctaw, Coahoma, Grenada, Hinds, Jefferson Davis, Kemper, Lafayette, Lamar, Lauderdale, Lowndes, Marshall, Monroe, Neshoba, Newton, Panola, Pike, Pontotoc, Prentiss, Quitman, Simpson, Smith, Tippah, Tishomingo, Union, Yalobusha.

Very common in northern part of the state, less common to the south; absent to date from counties bordering Gulf of Mexico. Breeds in a variety of natural and man-made ponds, swamps, and marshy wetlands.

Libellula flavida Rambur

17 April–13 October; Bick, 1950; Calhoun, Carroll, Clarke, Forrest, George, Greene, Hancock, Harrison, Jackson, Jefferson Davis, Kemper, Lafayette, Lamar, Marshall, Montgomery, Pearl River, Perry, Simpson, Stone, Tishomingo, Webster, Yalobusha.

Common throughout eastern part of the state; apparently absent from Delta. Breeds in permanent, often spring-fed, seepage pools and ditches, usually associated with forest.

Libellula incesta Hagen

8 May–19 September; Bick, 1950; Adams, Amite, Attala, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Choctaw, Clarke, Clay, Coahoma, Copiah, Covington, Desoto, George, Greene, Grenada, Hancock, Harrison, Hinds, Holmes, Humphreys, Itawamba, Jackson, Jasper, Jefferson Davis, Jones, Kemper, Lafayette, Lamar, Lawrence, Leake, Lee, Leflore, Lowndes, Madison, Marion, Marshall, Monroe, Montgomery, Neshoba, Noxubee, Oktibbeha, Panola, Pearl River, Perry, Pike, Pontotoc, Prentiss, Quitman, Rankin, Sharkey, Simpson, Stone, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Walthall, Washington, Webster, Winston, Yazoo.

Common throughout the state; should occur in every county. Breeding habitat includes a wide variety of lentic waters, including large reservoirs.

Libellula luctuosa Burmeister

24 April–6 September; Bick, 1950; Amite, Attala, Bolivar, Calhoun, Carroll, Chickasaw, Choctaw, Clay, Hinds, Jasper, Jefferson Davis, Kemper, Lafayette, Lawrence, Lee, Lowndes, Marshall, Monroe, Oktibbeha, Pontotoc, Rankin, Simpson, Smith, Tishomingo, Union, Warren, Washington, Webster, Winston, Yalobusha, Yazoo.

Common across much of the state; apparently absent from extreme southeast. Found around a variety of ponds, lakes, reservoirs, and sluggish rivers.

Libellula needhami Westfall

13 May–27 August; Westfall, 1943; Hancock, Harrison, Jackson, Pearl River.

Rarely strays far inland throughout its range; restricted to extreme southern counties in Mississippi. Breeding habitat includes freshwater or, more often, slightly brackish ponds, marshes, and vegetated sloughs and ditches.

Libellula pulchella Drury

10 May–4 October; Bick, 1950; Calhoun, Coahoma, Holmes, Lafayette, Montgomery, Oktibbeha, Smith, Tippah, Winston.

Widespread across much of its range, but not common anywhere in Mississippi; occasionally encountered in northern

half of state, but absent to date from southern counties. Pond species that may also inhabit reservoirs and sluggish river pools.

Libellula semifasciata Burmeister

16 March–24 July; Bick, 1950; Choctaw, Forrest, George, Greene, Hancock, Harrison, Hinds, Jackson, Jasper, Jones, Kemper, Lamar, Lauderdale, Lincoln, Madison, Neshoba, Oktibbeha, Pearl River, Perry, Rankin, Stone, Winston.

Occurs statewide or nearly so; apparent absence from northern third is probably reflective of a lack of collecting effort. Found around marshy ponds, seepage drainages, and open, grassy wetlands.

Libellula vibrans Fabricius

25 April–8 December; Bick, 1950; Amite, Carroll, Choctaw, Claiborne, Clay, Coahoma, Covington, Desoto, Forrest, George, Greene, Grenada, Hancock, Harrison, Hinds, Holmes, Itawamba, Jackson, Jefferson Davis, Kemper, Lafayette, Lamar, Lawrence, Leake, Leflore, Lincoln, Lowndes, Marshall, Monroe, Montgomery, Noxubee, Oktibbeha, Panola, Pike, Prentiss, Quitman, Rankin, Sharkey, Simpson, Smith, Stone, Tallahatchie, Tate, Tishomingo, Tunica, Walthall, Webster, Winston.

Large, common libellulid that should eventually be found in every county. Found around almost any swamp, slowly flowing forested stream, wooded pool, or oxbow slough.

Macrodiplax balteata (Hagen)

15 July–28 August; Wright, 1939; Hancock, Harrison, Jackson.

Collected only in counties bordering Gulf of Mexico; unlikely to be found elsewhere in the state. Typical habitat is brackish or heavily mineralized lentic waters.

Miathyria marcella (Selys)

29 May–18 September; New State Record; Adams, Greene, Jasper, Lawrence, Perry.

This Neotropical species, first documented from the US in Florida in 1934 (Dunkle, 1989), is slowly expanding its range northward throughout the Gulf states; we report it here for the first time in Mississippi, based on collections made from several counties in southern part of the state. Breeding habitat includes ponds, ditches, and stream pools, almost always characterized by a heavy growth of floating aquatic vegetation, usually including water hyacinth.

Nannothemis bella (Uhler)

18 April–16 June; Westfall, 1952; George, Stone.

Smallest of the North American Anisoptera; to date collected only in extreme southern portion of state. Should be found at additional localities where nymphal habitat, seepage bogs and trickles, occurs. Mississippi apparently represents the western limit of the species' range in the southeastern US.

Orthemis ferruginea (Fabricius)

24 April–6 November; Bick, 1950; George, Hancock, Harrison, Jones, Pearl River.

Found in several counties in southern Mississippi; undoubtedly more common than current records indicate. Usually associated with ponds, pools, and roadside ditches.

Pachydiplax longipennis (Burmeister)

30 March–25 October; Bick, 1950; Adams, Alcorn, Amite, Attala, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Choctaw, Claiborne, Clarke, Clay, Coahoma, Copiah, Covington, Desoto, Forrest, Franklin, George, Greene, Grenada, Hancock, Harrison, Hinds, Holmes, Humphreys, Issaquena, Itawamba, Jackson, Jasper, Jefferson, Jefferson Davis, Jones, Kemper, Lafayette, Lamar, Lauderdale, Lawrence, Leake, Lee, Leflore, Lincoln, Lowndes, Madison, Marion, Marshall, Monroe, Montgomery, Neshoba, Newton, Noxubee, Oktibbeha, Panola, Pearl River, Perry, Pike, Pontotoc, Prentiss, Quitman, Rankin, Scott, Sharkey, Simpson, Smith, Stone, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Union, Walthall, Warren, Washington, Wayne, Webster, Wilkinson, Winston, Yalobusha, Yazoo.

With the possible exception of *Erythemis simplicicollis*, the most commonly encountered dragonfly in Mississippi. Recorded from every county in the state, and found at almost all lentic habitats.

Pantala flavescens (Fabricius)

25 March–2 November; Bick, 1950; Adams, Attala, Calhoun, Clarke, Clay, Coahoma, Covington, Forrest, Franklin, Greene, Hancock, Harrison, Hinds, Issaquena, Jefferson, Kemper, Lafayette, Leflore, Lowndes, Marshall, Montgomery, Oktibbeha, Pearl River, Perry, Quitman, Sharkey, Stone, Warren, Wayne, Winston.

Common, found throughout the state; adults may occur far from any water. Nymphs of this pioneer species develop very quickly and are adapted for newly created lentic habitats, including roadside ditches, puddles, and even artificial ponds and fountains. Should eventually be found in every county.

Pantala hymenaea (Say)

20 May–4 September; Bick, 1950; Alcorn, Benton, Clay, Forrest, Grenada, Harrison, Hinds, Issaquena, Jackson, Lee, Leflore, Panola, Quitman, Sharkey, Stone, Sunflower, Tallahatchie, Tate, Warren, Washington, Winston.

Occurs throughout Mississippi; encountered less often than *P. flavescens*. Breeding habitat is open, usually temporary, lentic waters.

Perithemis tenera (Say)

14 March–4 October; Bick, 1950; Adams, Alcorn, Amite, Attala, Bolivar, Calhoun, Carroll, Chickasaw, Choctaw, Claiborne, Clarke, Clay, Coahoma, Covington, Desoto, Forrest, Franklin, George, Greene, Grenada, Hancock, Harrison, Hinds, Holmes, Humphreys, Issaquena, Itawamba, Jackson, Jasper, Jefferson, Jefferson Davis, Jones, Kemper, Lafayette, Lauderdale, Lawrence, Leake, Lee, Leflore, Lowndes, Madison, Marion, Marshall, Monroe, Neshoba, Newton, Noxubee, Oktibbeha, Panola, Perry, Pike, Prentiss, Quitman, Rankin, Scott, Sharkey, Simpson, Smith, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Union, Warren, Washington, Webster, Wilkinson, Winston, Yalobusha, Yazoo.

Common throughout the state and should occur in every county. Breeding habitat includes a variety of lentic waters such as ponds, swamps, lakes, and margins of slowly flowing streams and rivers.

Plathemis lydia (Drury)

20 March–4 October; Bick, 1950; Adams, Alcorn, Amite, Attala, Benton, Calhoun, Carroll, Chickasaw, Choctaw, Claiborne, Clarke, Clay, Coahoma, Copiah, Covington, Desoto, Franklin, George, Grenada, Hancock, Harrison, Hinds, Holmes, Humphreys, Issaquena, Itawamba, Jackson, Jasper, Jefferson, Jefferson Davis, Jones, Kemper, Lafayette, Lamar, Lauderdale(N), Lawrence, Lee, Lowndes, Madison, Marshall, Monroe, Montgomery, Neshoba, Noxubee, Oktibbeha, Panola, Pearl River, Perry, Pike, Pontotoc, Prentiss, Quitman, Rankin, Scott, Sharkey, Simpson, Smith, Stone, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Walthall, Warren, Washington, Wayne, Webster, Wilkinson, Winston, Yalobusha, Yazoo.

Common and often abundant in suitable habitat; should eventually be found in every county. Habitat includes nearly any lentic water with a soft substrate, as well as still pools in sluggish streams.

Sympetrum ambiguum (Rambur)

17 May–12 November; Bick, 1950; Amite, Hancock, Har-

risson, Hinds, Lafayette, Marshall, Noxubee, Oktibbeha, Tippah, Winston.

Collected at widely scattered localities across the state; apparently more common in the north. Usual habitat includes marshy stream pools, small lakes, and ponds.

Sympetrum corruptum (Hagen)

1 April–25 October; Bick, 1950; Hancock, Harrison, Oktibbeha, Washington.

Largely western species that is uncommon in Mississippi; usually found around open ponds.

Sympetrum vicinum (Hagen)

29 May–7 November; Westfall, 1952; Calhoun, Choctaw, Copiah, George, Hinds, Lafayette, Marshall, Pontotoc, Prentiss, Tishomingo.

Late season species found across Mississippi, but much more common in northern half of state; typical habitat includes beaver ponds and other marshy, still waters.

Tramea carolina (Linnaeus)

20 March–25 October; Bick, 1950; Adams, Amite, Copiah, Covington, Forrest, Franklin, George, Greene, Grenada, Hancock, Harrison, Hinds, Humphreys, Jackson, Jasper, Lafayette, Lowndes, Marion, Oktibbeha, Pearl River, Stone, Tallahatchie, Warren, Washington, Winston, Yazoo.

Common throughout the state. Inhabits a variety of lentic habitats and may be migratory along the coast.

Tramea lacerata Hagen

1 March–25 October; Bick, 1950; Chickasaw, Clay, Coahoma, Covington, Grenada, Hancock, Hinds, Issaquena, Jasper, Lafayette, Lee, Marion, Montgomery, Noxubee, Oktibbeha, Pontotoc, Prentiss, Sunflower, Tallahatchie, Tate, Tishomingo, Union, Washington, Yazoo.

Common, but less so than *T. carolina*; apparently more restricted to northern ⅓ of state (although this could be an artifact of inadequate collecting effort). Inhabits wide variety of lentic habitats and known to be somewhat migratory.

Tramea onusta Hagen

6 May–27 September; Bick, 1950; Coahoma, Hancock, Lafayette, Oktibbeha, Simpson.

Least encountered member of genus in the state. Uncommon throughout southeastern US east of Mississippi River, although close resemblance to *T. carolina* may cause it to be undercollected and therefore underrepresented in collections. Breeding habitat includes ponds, sloughs, and ditches.

Doubtful Records

Boyeria grafiana Williamson. Stanford & Lago (1981) reported this species from Mississippi based on two nymphs collected in Tishomingo Co. in the extreme northeastern corner of the state. One of us (SK) has examined these specimens and they are not *B. grafiana*, but are instead half-grown *Epiaeschna heros*. This fits much better with the description given in the above publication that “. . . immature *Boyeria* are usually associated with slow-moving woodland streams . . . however, these two nymphs were collected from the mucky bottom of a swampy roadside pond.” As there are no other records for the species in the state, we have removed *B. grafiana* from the Mississippi list.

Gomphus (Gomphus) minutus Rambur. Listed for Mississippi in Needham, Westfall & May (2000). We could not locate any Mississippi specimens in the FSCA or elsewhere, and the species' range lies well to the east of the state, so we have chosen to remove *G. minutus* from the state list.

Stylurus spiniceps (Walsh). Louton (1982) reported the species from Benton Co. in the northern part of the state, based on one male collected in 1976. It is also listed in Needham, Westfall & May (2000), almost certainly based on this same specimen. Correspondence with Louton revealed that the specimen is housed in the National Museum of Natural History collection and that “. . . the poorly preserved (no colors) specimen of ‘*spiniceps*’ is definitely a *plagiatus*” (Jerry Louton, pers. comm.). Based on this information, we have removed *S. spiniceps* from the Mississippi list.

Cordulegaster diastatops (Selys). First listed from the state by Westfall (1952). Carle (1983) placed all Mississippi records of *C. diastatops* in his newly described species, *C. bilineata*. The nearest records of *C. diastatops* are from West Virginia (Donnelly, 2004a).

Epitheca (Tetragoneuria) stella Williamson in Muttkowski. Reported for Mississippi by Kormondy (1960), based on a female from Adams Co. near Natchez. The presumed range for this species is Florida and southern Georgia; however, Mauffray (1997) does report a specimen from Louisiana. We consider Kormondy's record questionable at best and, until a bona fide specimen is found in the state, we choose not to include *E. stella* on our Mississippi list.

Expected/Possible Species

Archilestes grandis (Rambur). Overall range expanding north

and east; has been found in northern portions of Georgia and Alabama, and may eventually be found in northern Mississippi.

Ischnura verticalis (Say). Found in a couple of localities in southern Tennessee, not far from the state line; could possibly occur in northern Mississippi.

Stylurus amnicola (Walsh). Historically known to occur in Alabama and Louisiana; might occur along a medium to large, sandy/silty river somewhere in Mississippi.

Epithea (*Tetragoneuria*) *semiaquea* (Burmeister). Distribution centered in two areas: Along the Atlantic Coast and in east Texas. No records to date from intervening states of Louisiana, Alabama, or Mississippi; a small breeding population could exist somewhere in the state.

Epithea (*Tetragoneuria*) *sepia* (Gloyd). Known to date from Florida, Georgia, and Alabama; has been collected in Mobile Co., Alabama, immediately adjacent to Mississippi. Would not be surprising to discover this species in extreme southeastern portion of state.

Helocordulia uhleri (Selys). Overall distribution approaches northeast corner of Mississippi from east (Alabama) and north (Tennessee). Only *H. selysii* is currently known from the state. The two species are sympatric or nearly so in northwest Alabama (Tennessen et al., 1995) and may also occur together in northeast Mississippi.

Neurocordulia obsoleta (Say). Records widely scattered across the southeastern US from Louisiana to the Atlantic states; in many of these states, some of which have received far more collecting effort than Mississippi, there are only one or two records for the species. Increased collecting effort is likely to reveal a population of *N. obsoleta* in the state.

Erythemis vesiculosa (Fabricius). US distribution centered mainly in Texas and south Florida; one specimen collected in Mobile Co., Alabama, adjacent to Mississippi. This species could be encountered somewhere in the southern part of the state.

Tramea calverti Muttkowski. A tropical species known to wander extensively; individuals have been found periodically as vagrants along the Gulf and Atlantic coastal states and rarely as far inland as Iowa (Dunkle, 1989). An undocumented sight record exists from one of the Mississippi barrier islands; its occasional presence somewhere along the coast would not be unexpected.

Conservation

The southeastern US has few high quality aquatic systems remaining (Smith et al., 2002). Rivers have been extensively

channelized for navigation and dammed for hydropower or flood control. River modification (flow diversion, dredging, levees, bank destabilization, etc) stands among the greatest threats to biodiversity protection in Mississippi, alongside urban and suburban development and incompatible forestry practices (MMNS, 2005). Probably not coincidentally, most imperiled odonate species in the southeast breed in lotic systems. About 18% of US Odonata are globally ranked as “vulnerable” or “imperiled” (Master et al., 2000), and as a group they are ecologically sensitive and face numerous human threats (Richter et al., 1997). Invertebrates are often ignored in conservation planning, thus it is not surprising that aquatic insects have been left out as priority targets for freshwater conservation actions in Mississippi and the greater southeast region (Smith et al., 2002; MMNS, 2005). In Mississippi the omission is not from careless oversight or believing that populations are secure, but rather because most invertebrate taxa (including insects) are “. . . deemed insufficiently well-known to warrant status evaluation” (MMNS, 2005). As the best available information, we hope this paper will help motivate and inform changes in the protection status of Mississippi Odonata.

All states and outlying territories of the US are federally mandated to develop wildlife action plans under a Comprehensive Wildlife Conservation Strategy (CWCS). The current version of the Mississippi CWCS (MMNS, 2005) excludes insects from consideration as species of greatest conservation need (SGCN), even the Anisoptera, which comprise a third of the insect species included on the Mississippi Natural Heritage Program Animal Tracking List (MNHP, 2002). We feel that data in this paper allow a reasonable first approximation of state rankings for these species and we suggest other species for the Heritage lists and for consideration as SGCN (Table 1). Viewed as a working hypothesis, the information is flexible and subject to change with patterns of human activity or increasing knowledge of species’ abundance and distribution in the state.

Conservation actions recommended in the Mississippi CWCS are habitat-based and many would offer direct benefits to odonates. For example, among the highlighted habitats are small streams, swamp forests, the Tombigbee River drainage, and estuarine marshes. According to the Mississippi CWCS, key threat issues in these systems include incompatible water quality, invasive species, channel modification, altered hydrology (flow), and residential development. In response, the plan calls for controlling exotic and invasive plants and animals, improving agricultural/forestry/watershed land-use planning through best management practices, addressing non-point source pollution, maintaining/restoring hydrologic, channel, and floodplain integrity, and encouraging buffers adjacent to wetlands. These actions and a continuation of coordinated efforts to promote private land stewardship are critical to protecting remaining habitat for odonates in the state.

Table 1. Recommended additions to Mississippi's primary species conservation lists, with proposed status rankings.

Species ¹	Proposed Conservation List ²	Proposed State Ranks ³	Proposed Tier Ranks ⁴
LESTIDAE			
<i>Lestes forficula</i>	1, 3	SU	Tier3
<i>Lestes rectangularis</i>	2,3	S3	Tier3
COENAGRIONIDAE			
<i>Amphiagrion saucium</i>	2, 3	S2	Tier2
<i>Argia translata</i>	2, 3	S2	Tier2
<i>Chromagrion conditum</i>	2, 3	S2	Tier2
<i>Enallagma concisum</i>	2, 3	S2	Tier2
<i>Enallagma davisii</i> †	1, 3	S1	Tier2
<i>Enallagma pallidum</i>	2, 3	S2	Tier2
<i>Enallagma pollutum</i>	2, 3	S2	Tier2
<i>Ischnura prognata</i>	2, 3	S2	Tier2
<i>Nehalennia gracilis</i>	2, 3	S2	Tier2
PETALURIDAE			
<i>Tachopteryx thoreyi</i>	2, 3	S2	Tier2
AESHNIDAE			
<i>Aeshna umbrosa</i>	2, 3	S2	Tier2
GOMPHIDAE			
<i>Aphylla angustifolia</i>	1, 3	SU	Tier3
<i>Arigomphus lentulus</i>	1, 3	S1	Tier2
<i>Arigomphus villosipes</i>	2, 3	S2	Tier2
<i>Dromogomphus armatus</i>	2, 3	S3	Tier3
<i>Gomphus australis</i>	1, 3	S1	Tier1
<i>Gomphus dilatatus</i>	1, 3	S1	Tier2
<i>Gomphus geminatus</i> †	1, 3	S1	Tier1
<i>Gomphus hodgei</i> *	1, 3	S2	Tier2
<i>Gomphus hybridus</i> *	2, 3	S3	Tier3
<i>Gomphus modestus</i> *	2, 3	S3	Tier3
<i>Ophiogomphus australis</i> *	1, 3	S1	Tier1
<i>Stylogomphus albistylus</i>	1, 3	S1	Tier2
<i>Stylurus laurae</i> *	2, 3	S3	Tier3
<i>Stylurus potulentus</i> *	1, 3	S1	Tier1
<i>Stylurus townesi</i> *	1, 3	S1	Tier1
CORDULEGASTRIDAE			
<i>Cordulegaster bilineata</i>	2, 3	S2	Tier2
<i>Cordulegaster erronea</i>	1, 3	S1	Tier1
MACROMIIDAE			
<i>Macromia alleghaniensis</i>	2, 3	S2	Tier2
CORDULIIDAE			
<i>Epitheca spinosa</i> †	1, 3	S1	Tier2
<i>Helocordulia selysii</i>	2, 3	S3	Tier3
<i>Neurocordulia alabamensis</i> †	2, 3	S3	Tier3
<i>Neurocordulia yamaskanensis</i>	1, 3	S1	Tier2
<i>Somatochlora georgiana</i> *	1, 3	S2	Tier2
<i>Somatochlora provocans</i> *	1, 3	S2	Tier2
LIBELLULIDAE			
<i>Celithemis amanda</i>	2, 3	S2	Tier2
<i>Celithemis bertha</i> †	2,3	S2	Tier2
<i>Celithemis verna</i>	2, 3	S2	Tier2
<i>Erythrodiplax umbrata</i>	1, 3	S1	Tier2
<i>Macrodiplax balteata</i>	2, 3	S2	Tier2
<i>Nannothemis bella</i>	1, 3	S1	Tier2

¹ Species marked with an asterisk (*) were previously listed on the Mississippi Natural Heritage Program Tracking List (MNHP, 2002), but no rankings were assigned (i.e., previously "S?" for "Unranked"); species marked with a dagger (†) are reported from the state for the first time in this publication.

² 1: Mississippi Natural Heritage Program Tracking List; 2: Mississippi Natural Heritage Program Watch List; 3: Mississippi's Comprehensive Wildlife Conservation Strategy Species of Greatest Conservation Need.

³ Rankings used by MNHP (2002):

S1: Critically imperiled in Mississippi because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it vulnerable to extirpation.

S2: Imperiled in Mississippi because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it vulnerable to extirpation.

S3: Rare or uncommon in Mississippi (on the order of 21 to 100 occurrences).

SU: Possibly in peril in Mississippi but status uncertain; need more information.

⁴ Rankings used by MMNS (2005):

Tier 1: Species that are in need of immediate conservation action and/or research because of extreme rarity, restricted distribution, unknown or decreasing population trends, specialized habitat needs and/or habitat vulnerability. Some species may be considered critically imperiled and at risk of extinction/extirpation.

Tier 2: Species that are in need of timely conservation action and/or research because of rarity, restricted distribution, unknown or decreasing population trend, specialized habitat needs or habitat vulnerability or significant threats.

Tier 3: Species that are of less immediate conservation concern, but are in need of planning and effective management due to unknown or decreasing population trends, specialized habitat needs or habitat vulnerability.

Tier 4: Species listed as extirpated from Mississippi, of historical occurrence only, or accidental. While no conservation action or research is recommended at this time, these species remain a GSN in the event that taxa may be rediscovered or reintroduced from populations existing outside the state.

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Begin the article with title, author name(s), and contact information (especially e-mail) with a line between each. The article or note should follow this information. Paragraphs should be separated by a line and the first line should not be indented. Where possible always refer to the scientific name of a species followed by its official common name in parentheses.

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