

**TWIG Final Report**  
**Survey and Inventory of Gyrinids**  
**in Big Thicket Wetlands**  
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**1. Abstract**

Gyrinids were collected from lotic and lentic sites in the Texas Big Thicket, where species frequently exhibited aggregation. Aggregations consisted of two or more species, and some aggregations had species representing up to three genera: *Dineutus* MacLeay, *Gyretes* Brullé and *Gyrinus* Müller. The composition of these aggregations is described along with habitat preferences. In the Big Thicket region of east Texas, gyrinids are most commonly found in species aggregations and were rarely collected in as single species groups.

**2. Acknowledgments**

Diana Hernandez, Laura Englehart, Shirley Carrias and Andres Palencia are thanked for their help in the field and laboratory. The project was supported by a grant from the National Science Foundation (DEB-0340782) The financial support of the Big Thicket Association and the assistance of Thicket of Diversity Director, Mona Halvorsen, are also appreciated. The housing provided at the Field Research Station in Saratoga and the opportunity to collect in the Big Thicket National Preserve made for unique and successful research experiences. Thanks to Mary Catherine Johnston for her help putting together this report. Dr. Jerry L. Cook of Sam Houston State University provided valuable advice for this study.

**3. Introduction**

The tendency to form aggregations is one of the Gyrinidae's most peculiar attributes. Istock (1966) described

these aggregations as being composed of several species and sometimes two genera. Gyrinid aggregations are found on the surface of a wide variety of aquatic environments, including: ponds, lakes, streams, swamps, and bayous. These aggregations can contain thousands of beetles and have been reported to act primarily as a mechanism for detecting and avoiding predators (Romey and Rossman 1995). Aggregations work as selfish herds, in that beetles in the center of the aggregation are less likely to become prey and individuals joining the group benefit through the dilution effect, since attack rate per individual whirligig beetle decreases with increase in group size (Watt and Chapman 1998). Large aggregations benefit through increased vigilance in that larger groups are able to detect predators sooner. (Vulinec and Miller 1989). Benfield (1972) suggested that aggregations may work to advertise a defense secretion, composed primarily of gyrinidal. However, this seems doubtful since the defense secretion is only released in significant quantities when attacked or handled (Heinrich and Vogt 1980). Aggregations may also work to confuse predators with a flurry of activity.

The purpose of this study was to inventory Gyrinidae of the Texas Primitive Big Thicket and to survey their aggregating behavior, including the composition of their aggregations and their habitat preference. There have been several previous studies that note aggregations occurring between species (Fall 1922, Hatch 1925, Young 1947, Brink 1955, Robert 1955, Wood 1962, Istock 1966, Folkerts and Donovan 1973, Walls 1974, Folkerts 1979, Heinrich and Vogt 1980, and Oygur and Wolf 1991), but there has been little analysis of these aggregations other than which species were present. None of the previous observations were made on the group of species that occur in the Big Thicket region. We observe these aggregations for the first time in this region of North America and document the aggregations throughout this region.

#### 4. Methods

Gyrinids were collected between February 2005 and September 2006 from eight Texas sites. In the Primitive Big Thicket these included: Little Pine Island Bayou, Hardin Co.; Turkey Creek, Tyler Co.; Collin's Pond, Polk Co.; Beaver Slide Pond, Polk Co.; and Upper Neches River, Unnamed tributary, Jasper Co. Gyrinids were collected with dip nets in lentic and lotic sites. Due to the gyrinids' similarity in behavior and appearance, species and gender could not be determined during collection, helping to prevent bias in collecting samples from aggregations. Attempts were made to collect entire aggregations, although a few species evaded capture. Specimens were identified using keys by Wood (1962), Oygur and Wolfe (1991) and Babin and Alarie (2004). *Dineutus* and *Gyrinus* were soaked in a solution of 80% ethanol alcohol after collection and their genitalia were pulled out from between the tergum and sternum of the caudal abdominal segments with sharpened forceps. *Dineutus* were primarily identified by the shape of their genitalia and elytral apices. All specimens were identified, labeled, and deposited as voucher specimens in the insect collection at Sam Houston State University.

#### 5. Results

Eight species of gyrinids in three genera were collected in the Texas Primitive Big Thicket. Many of these collections represent new locality records. This is the first report of *Gyrinus gibber* LeConte occurring in Texas, herein documented from Hardin Co. and Polk Co.. The closest previously reported collection site was in central Louisiana (Oygur and Wolfe 1991). *Gyrinus analis* Say was previously reported from southeastern Texas, and is now documented also in Hardin Co. and Polk Co.. *Gyrinus pachysomus* Fall was previously only known in Texas from the northeast and is now reported from Polk Co. in southeast Texas. *Gyretes sinuatus* had previously been reported in east Texas from only Polk Co and is now reported from Tyler Co..

Several trends were observed. Females were more numerous in many of the aggregations. Out of 22 collections only six had more males than females. However, neither gender is statistically more common in aggregations in this region ( $P = 0.22$ ) *Dineutus emarginatus* (Say) was commonly found with *D. carolinus* and to a lesser extent with *D. analis*. *Dineutus ciliatus* was found exclusively in lotic habitats. An additional trend that we observed was that aggregations changed at given locations in both species composition and proportion

of species represented.

Interestingly, at the Collin's Pond site on May 18, 2006 we observed two distinctly separate aggregations. The *Gyrinus* were aggregating on the shallow margins of the pond, protected by overhanging branches, while the *Dineutus* aggregation was further from the pond margin. At the same location on September 12, 2006 the water level of the pond was greatly reduced and the location where the *Gyrinus* had previously aggregated was no longer accessible. Consequently we found *Gyrinus* dispersed throughout with *Dineutus*. However the species of *Gyrinus* collected were different. An additional species of *Dineutus* was also present, but in very low numbers.

At almost all sites, *Gyrinus* species were found close to the water's edge, and often under overhanging branches or banks.

## 5.1 Sites Collected

Thicket of Diversity ATBI  
Gyrinidae (Whirligig Beetle)  
Species Inventory/Checklist by Unit  
4/14/2014

	Beech Creek Unit	Beaumont Unit	Big Sandy Creek Unit	Canyonlands Unit	Jack Gore Baygall Unit	Hickory Creek Unit	Lance Rosier Unit	Loblolly Unit	Lower Neches Creek Corridor Unit	Menard Creek Corridor Unit	Turkey Creek Unit	Upper Neches Corridor Unit	Village Creek Corridor Unit	Nature Conservancy Roy Larsen Sandylands	Texas State Park John H. Kirby State Forest
<b>Gyrinidae (Whirligig Beetles)</b>															
<i>Dineutus analis</i>			13		3		65					22		2	
<i>Dineutus carolinus</i>			22		29		83				52				
<i>Dineutus ciliatus</i>			15						56	11	7				
<i>Dineutus emarginatus</i>			419				65		2						
<i>Gyretes sinuatus</i>	3		18						9	5					
<i>Gyrinus analis</i>			2												
<i>Gyrinus gibber</i>			15												
<i>Gyrinus pachysomus</i>			29												

## 5.2 Species List

Checklist of Gyrinids in the Primitive Big Thicket

### *Dineutus* MacLeay

*Dineutus analis* Régimbart

*Dineutus carolinus* LeConte

*Dineutus ciliatus* Forsberg

*Dineutus emarginatus* (Say)

### *Gyrinus* Müller

*Gyrinus analis* Say

*Gyrinus gibber* LeConte

*Gyrinus pachysomus* Fall

### *Gyretes* Brullé

*Gyretes sinuatus* LeConte

### 5.3 Outreach - Publications and Presentations as a result of this work

#### *Why Study Beetles?!*

2013, Houston Museum of Natural Science, Houston, TX

2012, Big Thicket Science Café, Logon Café, Beaumont, TX

#### *Composition of gyrinid aggregations in the east Texas Primitive Big Thicket (Coleoptera: Gyrinidae)*

2008 Eastfield College Summer Institute, Big Thicket Research Station, Saratoga, TX

2008 Texas Academy of Science Conference, Corpus Christi, TX

2007 Big Thicket Science Conference, Beaumont, TX

Realzola, E. 2008. Summer Mentor. Eastfield College NSF STEP Big Thicket Summer Institute.

Realzola, E., Cook, J. L., Cook, T. J., & Clopton, R. E. (2007). Composition of gyrinid aggregations in the east Texas primitive Big Thicket (Coleoptera: Gyrinidae). *The Coleopterists Bulletin*, 61(4), 495-502.

Nov. 28, 2012. Many beetles in the Big Thicket, Hardin County News.

### 6. Possible Future Research Projects

Continued gyrinid survey of the Big Thicket National Preserve that focuses on new collection sites, including the Canyon lands Unit and Neches River and sites in Orange County are potential future research projects. In addition, whirligig inventories can contribute to wetland ecosystem analysis.

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# Many beetles in the Big Thicket

By BTA

Whirligig beetles have divided compound eyes, meaning it appears they have 4 eyes—two looking straight up and two looking down into the water. They are surface dwelling beetles.

Little black beetles fascinate Edward Realzola, a graduate of Sam Houston University with a BS in Biology.

Five years ago he studied under Dr. Jerry Cook and collected samples of gyrrinid water beetles, commonly known as Whirligigs, through the Thicket of Diversity All Taxa Biodiversity Inventory.

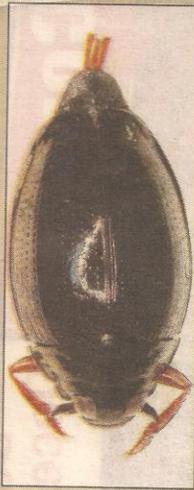
The project was inspired by Smoky Mountains National Park and is an attempt to identify all living species primarily in, but not necessarily limited to, the national park area.

Today Realzola's collection numbers approximately 400.

He estimates that he has identified 9 species with one that is potentially new to science.

The identification process involves use of Oygur and Wolfe's Classification, Distribution, and Phylogeny of North American (North of Mexico) Species of Gyrrinus Müller (Coleoptera: Gyrrinidae) published by the American Museum of Natural History.

The document is the accepted standard for gyrrinid beetle study and much re-



Big Thicket Association

Whirligig beetles have divided compound eyes, meaning it appears they have four eyes — two looking straight up and two looking down into the water. They are surface dwelling beetles.

## Meetings

■ Friday, "Whirligigs! Looking Up or Down?," Science Café at the Logon Café, 6-7 pm. Have you ever noticed groups of small, shiny beetles swimming in circles? If you have, then you've seen whirligigs! Learn more about these distinctive water beetles at a Science Café led by water beetle researcher Ed Realzola. Mr. Realzola has identified eight species of whirligigs that are new to the Big Thicket and one more species that may be new to science. Meet at the Logon Café, 3805 Calder, Beaumont, TX 77706.

■ Saturday, Whirligig Walk with Ed Realzola, Collins Pond, 10 a.m.. Location Details: CR 1910, 0.5 mile south of FM 2827, at Sundew Trailhead; Contact: 409-951-6700

ties one must first key it out beginning with a dichotomous or two choice key.

Initially, one must generally know the genus and be able to identify the tiny critter as male or female.

For Realzola, both of these tasks are easy to do.

Then one continues through the questions selecting A or B until arriving at the final answer that provides the species name.

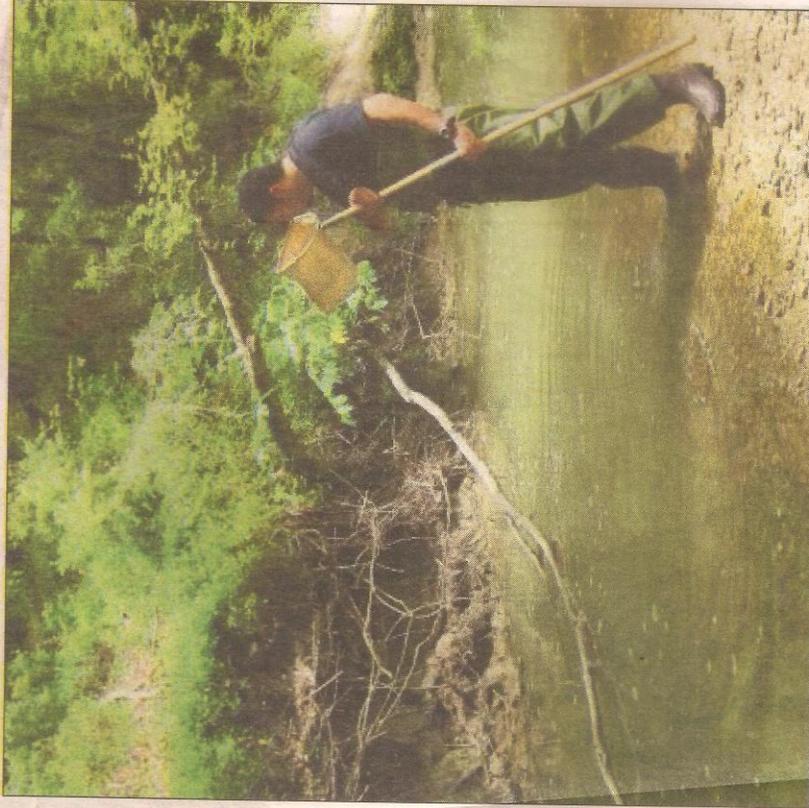
If a beetle is a rule break-

discovery new to science. Excitingly, Realzola found one.

He took photo measurements, summarized data in a detailed paper and consulted with a Canadian scientist.

He was encouraged by the experts to continue research.

When an opportunity arose, he took photos using Eastfield College's Electron Microscope. The next step will be to pursue genetic



Big Thicket Association

Beetle researcher Ed Realzola looks for whirligigs and other aquatic life.

The genetic results can be received in about 3 weeks but more time is required to write a report and submit the findings. The genetic testing will reveal if Realzola's beetle is a variation of a known species or one that is potentially new to science.

Inventory work does require a specialized laboratory. The genetic study is not new to science.

shared with Mona Halvorsen, Director of the Thicket of Diversity, and input into a national database housed by the US Park Service.

To date, 10 species have been identified and 1257 specimens have been collected in the Big Thicket.

Beaumont Enterprise

2B Friday, November 30, 2012

# Let's Go!

**NATURE** "Whirligigs! Looking Up or Down?" A Science Cafe program by water beetle researcher Ed Realzola, 6 p.m. Nov. 30 at the Logon Cafe, 3805 Calder Ave. Free. (409) 951-6700.

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**NATURE** "Whirligig Walk," a short hike with water beetle researcher Ed Realzola to Collins Pond to look for whirligigs and other aquatic life, 10 a.m. Dec. 1. Meet at the Woodlands Trailhead on FM 1276, 5.9 miles north of Dalardsville and 3.3 miles south of U.S. 190. Wear clothes and shoes that can get wet and muddy. Free. (409) 951-6700.