

ISSN 1061-8503

# ARGIA

The News Journal of the Dragonfly Society of the Americas

Volume 26

15 March 2014

Number 1

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Published by the Dragonfly Society of the Americas

<http://www.DragonflySocietyAmericas.org/>

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## Update on the 2014 DSA Annual Meeting in Wisconsin

Ken Tennessen <ktennessen@centurytel.net>

The web site for the DSA 2014 Annual Meeting, to be held 11–18 June 2014, is now live at <<http://mamomi.net/dsa2014/DSA2014>>. The web site is a one-stop shop where people can register for the main meeting as well as for pre- and post-meeting trips, find detailed information about lodging, get the scoop on recommended field guides, view a photo gallery of species likely to be encountered, and get their official DSA t-shirts ordered.

At the top of the Welcome page you will find links to other pages such as Registration, Pre-meeting, Main Meeting, Post-meeting, What to Expect, etc. We encourage people to register and also to order their t-shirts as early as their plans will allow, so we can estimate what to expect regarding number of attendees. Information on lodging throughout the entire meeting is also available on the web site. As a kindly reminder, there is a registration fee this year (\$20) which covers the Main Meeting and Saturday evening banquet, as well as other necessities of putting on the meeting. Please note: as stated on the registration page, do not send your check to Matt Berg prior to 15 April 2014.

We are still working on identifying field locations, and information on excursions will be posted on the website as we progress. On one of the website pages you will find is a list of the species we will possibly encounter. We will also be working with a local restaurant on the main course for the Saturday evening banquet. This means that even after you've registered, you should still be sure to check the website periodically for new information.

If you are attending the pre-meeting trip and are staying at Beaver Creek Reserve, please note that the accommodations are barracks-style (but really cheap, at around \$12/night), so you will need to remember to bring your own food, sheets, blanket,

pillow, bath towel, and soap. On the post-meeting trip, we are planning to grill out, provided there is enough interest.

Don't forget to pack your camera and flash cards! You will also want to supply yourself with insect repellent, which you can buy anywhere in Wisconsin. This is the time of year that mosquitoes, deer flies, horse flies, black flies, and of course several kinds of ticks are all waiting for you with empty stomachs so you will need repellents, and you'll also want to check yourself regularly in the field and afterwards for ticks.

As usual, we will have a silent auction at the meeting this year, so please consider whether you have any items to contribute. If you have items to put up for bid, please contact Joanne Kline at <[joanne@klines.org](mailto:joanne@klines.org)>.



This (slightly doctored) photo reminds us there are lots of meetings on the horizon and plenty of ode work to do! Sue Gregoire, NE DSA 2013, Devil's Hopyard State Park, Connecticut. Photo and post-processing by Pam Hunt.

*continued next page...*

## Calendar of Events

For additional information, see <<http://www.odonatacentral.org/index.php/PageAction.get/name/DSAOtherMeetings>>.

Event	Date	Location	Contact
2014 SE DSA Meeting	4–6 April 2014	Gainesville, Florida	Bill Mauffray < <a href="mailto:iodonata@gmail.com">iodonata@gmail.com</a> >
2014 Dragonfly Institute	17 May 2014	Athol, Massachusetts	Dave Small < <a href="mailto:dave@atholbirdclub.org">dave@atholbirdclub.org</a> >
2014 DSA Annual Meeting	13–15 June 2014	Ladysmith, Wisconsin	Ken Tennessen < <a href="mailto:ktennessen@centurytel.net">ktennessen@centurytel.net</a> >
2014 NE DSA Meeting	26–29 June 2014	Binghamton, New York	Bryan Pfeiffer < <a href="mailto:bryan@bryanpfeiffer.com">bryan@bryanpfeiffer.com</a> >
CalOdes Bioblitz	27–30 June 2014	Warner Mtns., California	Kathy Biggs < <a href="mailto:bigsnest@sonic.net">bigsnest@sonic.net</a> >

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If you have any questions about the meeting, contact Ken Tennessen <ktennessen@centurytel.net> or Bob DuBois <Robert.Dubois@wisconsin.gov>. You can also find addi-

tional contact information under on the meeting web site.

See you this summer in Wisconsin!



## Southeast Regional DSA Meeting and Field Trip, Gainesville, Florida, 4–6 April 2014

Bill Mauffray <iodonata@gmail.com>

The Southeast DSA meeting will be held on 4–6 April 2014 in Gainesville, Florida. Additional information can be found on the meeting web site at <<http://www.iodonatacentral.org/index.php/PageAction.get/name/SEDSA2014>>. If you are planning to attend the meeting, please RSVP directly to Bill Mauffray at <iodonata@gmail.com>. The current schedule is presented below.

**Friday 4 April:** All-day access to the Florida State Collection of Arthropods (FSCA) Odonata Collection, one of the largest and best-curated research collections in the world, plus collecting on your own or visiting some of the surrounding attractions (see information below). On Friday evening at 6 pm there will be a catered meal and informal meeting at the Doyle Conner Bldg (FSCA), plus an IORI garage sale. I am still pricing the food for the dinner and will keep you posted on costs.

**Saturday 5 April:** We will meet at the FSCA parking lot at 8 am for a field trip to Gold Head Branch State Park, about a 75 minute trip. The park is home of most of our early season forms such as *Cordulegaster sayi* (Say's Spiketail), *C. maculata* (Twin-spotted Spiketail), *Didymops floridensis* (Florida Cruiser), *Epiaeschna heros* (Swamp Darner), *Gomphaeschna antilope* (Taper-tailed Darner), *G. fuscillata* (Harlequin Darner), *Epithecica costalis* (Slender Baskettail), *E. stella* (Florida Baskettail), *Gomphus australis* (Clearlake Clubtail), *G. minutus* (Cypress Clubtail), *G. cavillaris* (Sandhill Clubtail), *G. dilatatus* (Blackwater Clubtail), *Ladona deplanata* (Blue Corporal), *Progomphus alachuensis* (Tawny Sanddragon), *Tachopteryx thoreyi* (Gray Petaltail), various libellulids (skimmers), *Ischnura prognata* (Furtive Forktail), *Telebasis byersi* (Duckweed Firetail), *Argia bipunctulata* (Seepage Dancer), *Enallagma davisii* (Sandhill Bluet), and others.

**Sunday 6 April:** An organized collecting trip to Gold Head Branch and/or other locations.

For the post-meeting, Jerrell Daigle has indicated that he is willing to lead people on a trip to the area just west of Tallahassee or perhaps the panhandle. Please contact Jerrell directly at <[jdaigle@nettally.com](mailto:jdaigle@nettally.com)> if you are interested.

**Accommodations:** A number of motels in a variety of price ranges are found near the intersection of I-75 and Archer Rd (SR-24). This area is about two miles from FSCA. The first five listed are on the southeast side of the intersection, the other are on the northeast side. Please note there is a large soccer tournament taking place the same weekend, so book your rooms now. The Super 8 had a lot of rooms available as of 22 January 2013, but we could not get a block discount. Hotels that were full at that time for the dates in question are also indicated.

Motel 6, 4000 SW 40th Blvd, \$42.99–48.99,  
352-373-1604

SleepInn and Suites, 4110 SW 40th Blvd, no vacancies,  
352-376-4145

Springhill Suites, 4165 SW 40th Blvd, \$105  
(no doubles left)

Super 8, 4204 SW 40th Blvd, \$69.99/double, 352-378-3888  
Hampton Inn, 4225 SW 40th Blvd, no vacancies,  
352-371-4171

Cabot Lodge, 3726 SW 40th Blvd, 352-375-2400

Comfort Inn, 3440 SW 40th Blvd, 352-264-1771

Holiday Inn Express SW, 3905 SW 43rd Street,  
352-376-0004

Marriott Hotel and Suites, 3700 SW 42nd Street,  
352-335-9100

Red Roof Inn, 3500 SW 42nd Street, \$95.99/double,  
352-336-3311

Residence Inn, 3275 SW 40th Blvd, 352-264-0000

Camping is available at the following sites, all of which are at least 10–20 miles away: Blue Springs Park <[www.bluespringspark.com/](http://www.bluespringspark.com/)>; Ginnie Springs <[www.ginniespringsoutdoors.com/](http://www.ginniespringsoutdoors.com/)>; O'Leno State Park <[www.floridastateparks.org/oleno/](http://www.floridastateparks.org/oleno/)>; and Paynes Prairie Preserve <[www.floridastateparks.org/paynesprairie/](http://www.floridastateparks.org/paynesprairie/)>. There is also camping at Gold Head Branch State Park <[www.floridastateparks.org/mikeroess/](http://www.floridastateparks.org/mikeroess/)>, which is 1–1.5 hours away from FSCA.

There is a lot of food to choose from along about a mile stretch of Archer Road (SR-24) between the motels and SW 34th street where the FSCA is located, including:

Four Rivers Smokehouse, Ale House, Arby's, Bonefish Grill, Burger King, Carrabba's, Chic-Fil-A, Chili's, Chiptole, Chuy's, Cody's Road House (just east of SW 34th St.), Dairy Queen, Firehouse Subs, Hungry Howie's, McDonalds, Moe's, Olive Garden, Outback, Pollo Tropical, Sonny's BBQ, Sushi Maturi, Taco Bell, Texas Road House, Tijuana Flats, T.G.I. Friday, Wendy's, Zaxby's, and Zoes. If you are into cooking your own food you can shop for supplies at Publix, Trader Joe's, and Sweatbay.

There is also a lot to do in the area, and you may want to come early or stay late to enjoy some of the local attractions, including: Devil's Mill Hopper Geological site <[www.floridastateparks.org/devilsmillhopper/](http://www.floridastateparks.org/devilsmillhopper/)>;


downtown Gainesville <[www.downtowngainesville.net/](http://www.downtowngainesville.net/)>; Florida Museum of Natural History <[www.flmnh.ufl.edu/mcguire/](http://www.flmnh.ufl.edu/mcguire/)>; Florida State Collection of Arthropods (FSCA) <[www.fscdpi.org/OverviewFrame.htm](http://www.fscdpi.org/OverviewFrame.htm)>; Harn Museum <[www.harn.ufl.edu/](http://www.harn.ufl.edu/)>; Hippodrome State Theatre <<http://thehipp.org/>>; McGuire Lepidoptera Center <[www.flmnh.ufl.edu/mcguire/](http://www.flmnh.ufl.edu/mcguire/)>; Oaks Mall <[www.theoaksmall.com/](http://www.theoaksmall.com/)>; Payne's Prairie <[www.floridastateparks.org/paynesprairie/](http://www.floridastateparks.org/paynesprairie/)>; Santa Fe River <<http://santaferiver.com/>>; and the University of Florida Entomology Department <<http://entnemdept.ufl.edu/>>.

It should be a great meeting. Hope to see you there! 

## 2014 Northeast Regional DSA Meeting Update

**Bryan Pfeiffer** <[bryan@bryanpfeiffer.com](mailto:bryan@bryanpfeiffer.com)>

Final details on our agenda and lodging are falling into place for the annual gathering of the Northeast chapter of the DSA, which will be held in Binghamton, New York from 26–29 June 2014. Our hosts are Nick and Ailsa Donnelly. We've lined up a hotel with a DSA nightly rate of \$85 plus tax, a picnic (and requisite *Neurocordulia* [Shadowdragon] site), and we will soon secure the necessary permits for the meeting. You'll find full details plus a list of folks who've registered so far on the meeting web site at <[www.bryanpfeiffer.com/nedsa](http://www.bryanpfeiffer.com/nedsa)>. We'll continue to update the site with meeting resources and news as information becomes available.

Our general itinerary is below, but note that it is subject to change. Attendees who arrive on Thursday 26 June will mostly likely gather informally for supper in Binghamton. On Friday morning we'll assemble in the hotel meeting room with maps and plans for a day in the field. You're on your own for supper on Friday night (options to follow), and we'll gather that evening to compare notes. Saturday will feature another field day followed by the barbecue, for which we'll pass the hat to cover costs. Sunday includes optional time in the field and farewells. 

## CalOdes Dragonfly Blitz, 27–30 June 2014, Warner Mountains, Modoc County, California and Nearby Areas in Nevada and Oregon

**Kathy Biggs** <[bigsnest@sonic.net](mailto:bigsnest@sonic.net)>

This year's CalOdes Dragonfly Blitz is being planned as a combination Butterfly Count/Dragonfly Blitz in the far northeastern corner of California in the Warner Mountains. The butterfly count will be held on Saturday 28 June; this is a brand-new count and is being coordinated by Joe Smith. The day preceding the count and two days after the count will be dragonfly-oriented, but of course our eyes won't be closed to Odes on the 28th, nor to butterflies on the other days!

The Warner Mountains are a very special area with lots of species possible that don't appear in other areas of California, for both odes and leps. The butterfly count circle in the northern Warners will encompass most of the northeastern

corner of the state. Ode forays may be planned to also go into the northwest corner of Nevada (Washoe County) and south-central Oregon (Lake County). A base camp will be established at Cave Lake (on a first-come, first-served basis) where we have camped twice before on Blitzes, and for those wishing to stay in a motel, there are some available in Cedarville and Alturas, California and in Lakeview, Oregon, each of which is approximately a 30–45 minute drive from Cave Lake but closer to some of the places we'll be surveying.

For those of you with access to Google Maps, Joe has created a link to a KMZ file at <[xa.yimg.com/kq/groups/4824489/893054361/name/290418.kmz](http://xa.yimg.com/kq/groups/4824489/893054361/name/290418.kmz)>; this link

will open in Google Earth to show the location and circumference of the butterfly count circle. The center of the counting circle is located at 41.8903° N, 120.1329° W. The butterfly count has a 15 mile diameter and includes such potential hotspots as Fandango Pass, Mt. Bidwell, Dismal Swamp, Surprise Valley, Fee Reservoir, Lake Annie, and areas of the foothills approach to Mt. Bidwell and eastern alkali flats as yet unexplored. The Dragonfly Blitz will include not only these areas but also less-explored areas of adjacent Nevada and Oregon.

If you are interested, please get in touch with the organizers. Joe will try to create teams for all the butterfly count areas and assign those at the base camp. The base camp at Cave Lake is on US Forest Service lands and is therefore first-come, first-served. It is located on Fandango Pass Rd. and there is no fee. The elevation is 6,600 ft. We hope you'll join us!

If you are skilled at counting or identifying butterflies and plan to attend, please let Joe Smith know. Those who are not skilled with butterflies can still help out as a field recorder and will learn more about leps during the count. Please let Kathy Biggs and/or Ray Bruun know if you plan to attend the dragonfly blitz, and whether you'll be camping or moteling (is that a word??).

Contacts:

Joe Smith, butterfly count coordinator (and originator!), <foxglove1985@yahoo.com>, 530-335-7055.

Kathy Biggs, dragonfly blitz, <bigsnest@sonic.net>, 707-823-2911.

Ray Bruun, <bruun@frontier.net>, 530-474-4559.



## **Final Update on Dragonflies of North America, 3rd Edition: the Light at the End of the Tunnel**

The Manual of the Dragonflies of North America will be shipping soon. As of 20 February 2014, the book was being printed, and delivery to me in Gainesville, Florida is expected by 10 March. Individual copies ordered in advance will be mailed out shortly after that. Thank you for your patience. There have been many delays getting this book out: weather, new species reported for our southern boundaries, timing of trips by editor/publisher, format changes to printing process, etc.

Dragonflies of North America by James G. Needham, Minter J. Westfall, Jr., and Michael L. May. 2014. Xvi +657 pp, text figures, plates (7 x 10 in.), cloth binding. Scientific Publishers, Gainesville, Florida.

The long-awaited 3rd edition monographic revision of the classic "Manual of the Dragonflies of North America" by Needham and Westfall (1955) is revised, with numerous additions and corrections for all the currently known species of North American dragonflies (Anisoptera), including all species (over 365) from Alaska to northern Mexico and the Greater Antilles. The text is completely revised by Westfall and May, with over 200 added figures for all newly-discovered species. The book includes an updated checklist to all species, a bibliography, glossary, distribution table, index, and keys to adults and known larvae.

The list price according to the publisher is estimated now to be \$165.00. By special arrangement with the publisher, the discounted sales price through IORI is \$150 for US deliveries, \$185 in Canada & Mexico, and \$195.00 elsewhere (includes shipping & handling). Florida residents must add 6.25% sales tax.

All funds are USD and must be paid in advance by check or money order made payable to "International Odonata Research Institute" or IORI. All profits will go to the International Odonata Research Institute.

VISA/Master Card orders can use PayPal to pay online (there is a 3% CC surcharge; calculate using the formula  $X/0.97$ ). You can also e-mail your order to <iodonata@gmail.com> and you will be reverse billed though your e-mail; a Paypal account is not necessary using this method.

Additionally, you can mail a check (USD only) to IORI, 4525 NW 53rd Lane, Gainesville, Florida 32653 USA, Attention: Bill Mauffray.

## A Few Notes on DSA History and Comments on Field Etiquette

Steve Valley <svalley2@comcast.net>

Every year around this time (late February) I start anticipating the coming dragonfly flight season. One of the best parts of each season for me is the annual DSA meeting and other gatherings with fellow odonate enthusiasts in the field. Seeing old friends and meeting new ones makes these events special. Another anticipation I have is the chance to explore and survey new regions and habitats and seeing species that are new to me.

DSA has members with diverse interests in the odonates, from pure observers to photographers to serious collectors. Our membership ranges from hobbyists, casual observers, and citizen scientists all the way to professional scientists studying behavior, distribution, taxonomy, evolution, genetics, population dynamics, and much more. This year (2014) is our 25th as a formal society, but the society's roots go back even further than that. Before the founding in 1989, small groups of collectors met in different regions and explored for good odonate habitats. DSA grew from these collecting trips and a desire as a group to document and understand the distribution of odonates across North America.

Over the years, dragonflies and dragonfly watching have become more and more popular in our culture and membership in DSA has grown. The society welcomes anyone who is interested, but at its core it is a scientific society and continues to be based on scientific principles to gain knowledge about odonates. Ethical collecting and careful observation go hand in hand to increase our knowledge. The DSA Collecting Guidelines can be found at <<http://www.odonatacentral.org/index.php/PageAction.get/name/DSACollectingPolicy>>.

Collections are important in a number of ways, including physical documentation of species occurrence and distribution, comparisons of specimens to determine variation in physical characteristics within and between species, and providing material for future students and scientists to study the distribution and population dynamics of our odonate fauna over time. Well-preserved specimens in collections are snapshots of time and place that can provide data to future generations of scientists for hundreds of years. Specimens collected presently and in the future will be helpful in documenting how the odonate fauna has responded to climate change and habitat disturbance from human activities. We would not have the wonderfully detailed field guides that we all carry around with us if people had not examined a range of collected specimens. Another important function of collections has emerged with the growth of DNA analysis. More and more DNA

work is being done on museum specimens using very small samples that cause minimal damage to the specimens. We can expect use of this analysis to increase in the future, thus specimens will be even more important. Collections may answer questions no one has thought of yet.

Photography is also an important tool in the study of odonates, but sometimes species cannot be reliably determined from photos. Locality and time data can also be separated from the photo or even lost and whole collections of digital photographs can be lost with a keystroke. So, while photos are extremely valuable, their availability to future generations cannot be guaranteed. People 100 years in the future may not know what a JPG is. Properly-curated specimens do not have that limitation.

DSA is a diverse society and there are many members who do not believe in collecting for a variety of philosophical reasons. Collectors understand and respect their personal beliefs but are convinced that ethical scientific collecting should continue to be part of the core foundational principles of DSA.

Recently, at two of the annual meetings (2011 in South Carolina; 2013 in Saskatchewan), people asked to see specimens and then abruptly, without the collectors' permission, released them. In both cases the specimens were the only ones of that species collected during the meeting and the collectors intended to keep them. The individuals who released the specimens excused their behavior with statements something like "Well, I don't collect." This is unacceptable behavior and in my opinion has no place in our society. One thing to remember is that even though only a few specimens of a particular species are seen or collected that does not indicate that they are particularly rare. We know that in stable populations of odonates, whether the individuals are concentrated or scattered, there are many more individuals than we see and that often the population numbers are huge. The number of specimens taken by collectors in almost all cases will have no impact on the survival of a species and in those rare cases of truly restricted habitats we expect all collectors to act in an ethical manner.


The field trips during the meetings are popular and often there can be quite a mob of people at some habitats pursuing many different activities. I like to collect, but I also spend a lot of time in the field photographing dragonflies. As a group we do not have a very good set of Field Etiquette Rules. Photographing dragonflies all by yourself can be a challenge, but in a group setting it is especially so. Often

we have travelled thousands of miles and spent hundreds to thousands of dollars to get to this habitat and we do not want to miss the opportunity to collect or photograph the species found here. In recent years I have had meeting attendees barge right up and scare away the specimen I was trying to shoot. I have even had people walk right between me and my subject, and have had people net the dragonfly I was photographing. If you see someone doing photography, please give them some space and try and move cautiously if you have to approach them. These simple courtesies should also be extended to people who are using a net or just observing odonates. They have the same expectation that no one will barge in and scare their subject away.

Sometimes other photographers will ask if they can photograph the same specimen you are shooting and that may be

OK, but they should wait until they are invited to approach. Some photographers want to spend a lot of time shooting a single subject, trying to get the perfect positioning or background or behavior, and it can be quite distracting to have others hovering behind you while they wait for you to finish. In some cases the photographer may want to collect the specimen they were shooting and that is their right.

Finally, we should all try to minimize the “mob effect” seen during field trips when everyone clusters into a small site, muddying the water and trampling the vegetation.

These are a few simple guidelines to think about and try to follow the next time you are in the field with a bunch of dragonfly lovers. It will guarantee everyone’s enjoyment of the experience. 

## 2014 Dragonfly Institute: Introduction to Odonates of Central Massachusetts

**Dave Small**, President, Athol Bird and Nature Club, Millers River Environmental Center, 100 Main Street, Athol, Massachusetts 01331 <Dave@atholbirdclub.org>

After more than a decade since the last Dragonfly Institute was held, we are pleased to announce the 2014 Dragonfly Institute will be held at the Millers River Environmental Center in Athol, Massachusetts beginning on 17 May 2014. The class is coordinated by Athol Bird and Nature Club president Dave Small in cooperation with the Massachusetts Natural Heritage and Endangered Species Program, and will feature some of New England’s premier naturalists who will share their knowledge and enthusiasm for odonates.

Curriculum will focus on the basics of dragonfly identification, but will also include discussions of dragonflies as indicators of environmental health, documentation of rare and unusual species, and dragonfly life history and behavior. The goal of the course is to provide participants with the basic skills of odonate identification and a solid base for the continued study and enjoyment of these amazing creatures.

Lectures and field trips will be held on the following Saturdays: 17 May, 31 May, 7 June, 21 June, and 12 July, 2014. Additional field opportunities will be announced at lectures. Lectures will be held on Saturdays from 9:00 to 10:00 am at the Millers River Environmental Center on 100 Main Street in Athol, Massachusetts and will include visual presentations, viewing prepared specimens, and discussion. Directions may be found on the web at <<http://www.atholbirdclub.org>>.

Field trips will meet at the Center at 10:00 am following the lecture. Each trip will focus on a limited number of habitats in or near the Millers River Watershed. Participants should be prepared to wade in streams, ponds, or other wet habitats. Hip boots or waders may be needed for early trips in cold river water and sandals may be useful in the warmer season. Participants should take precautions to protect themselves from biting insects and other vertebrate and invertebrate organisms.

Details on recommended equipment, books, and clothing will be provided to registered participants prior to the opening lecture. Registration information and a detailed curriculum will be developed as availability of instructors is determined.

Additional dragonfly events at the Center this summer include: the 3rd Annual Dragonflies and Damselflies for Families (Saturday 7 June, 10:30 am–12 pm), with educator Rachel Roberts and naturalist David Small, geared towards families with young children but has activities all ages can enjoy; and Dragonflies Along the Miller River, Saturday 7 June, 1 pm, with naturalists David Small and Lula Field leading an afternoon of intensive dragonfly searching.

For more information about any event contact David Small at 978-413-1772 or <Dave@dhsml.net>. 



## 14th Annual Oregon *Aeshna* Blitz

Steve Gordon, 1140 W. 24th Ave., Eugene, Oregon <scfgordon24@comcast.net>

When members of the Oregon Dragonfly Survey convened their annual meeting at a coffee shop in Albany, Oregon in February 2013, they agreed wisely to conduct the 14th Annual Oregon “*Aeshna* Blitz” in the Wallowa Mountains in the state’s northeastern corner. The Blitz had never ventured to this far region, and recent discoveries made this choice intriguing, with additions to the state list made by Jim Johnson in 2009, i.e. *Lestes forcipatus* (Sweetflag Spreadwing), OC# 314568 on 2 August 2009; and *Aeshna tuberculifera* (Black-tipped Darner), OC# 314572, on 3 August 2009 (See Johnson, J. 2009. Two New Odonates for Oregon in Two Days. *ARGIA* 21(3): 22). There was also the interesting discovery of *Aeshna canadensis* (Canada Darner; OC# 378463) at Duck Lake, Wallowa County, by Cary Kerst on 2 August 2012, the first Oregon record outside the Cascade Range.

Traveling from various locations in Oregon and southwestern Washington, attendees headed for the Twin Lakes Campground on the Wallowa-Whitman National Forest on the southern side of the Wallowa Mountains. To reach the Blitz site, Ron Lyons drove a 600 mile route from his Curry County home in southwestern Oregon. This year's nine attendees were Sherry Daubert, Steve Gordon, Jim Johnson, Cary Kerst, Ron Lyons, Steve Valley, and Josh, Michelle, and Xabrina Vlach.

Half the Blitz fun is in “the getting there”. Steve Gordon and Cary Kerst stopped in the late afternoon of 15 August in Union County to visit the pond on Lookout Mountain where *Aeshna tuberculifera* (Black-tipped Darner) was first discovered in Oregon. Thirteen females were found during the afternoon, many ovipositing low in vegetation, but no males were observed. The next morning at that same pond three male *A. tuberculifera* were observed, but no females. Sightings of Dusky Grouse, Elk, and Black Bear were bonuses in the Blue and Wallowa Mountains on the way to Twin Lakes.

Also on 15 August, Jim Johnson found *Enallagma clausum* (Alkali Bluet) along the Columbia River, a new Morrow County record (OC# 403359). This turned out to be the best record for the Blitz, for it expanded our knowledge of this species’ Oregon range. Prior to this Columbia River Basin discovery, *E. clausum* was known only from southeastern Oregon.

On 16 August, Steve Gordon and Cary Kerst stopped at Victor Pond at the intersection of Promise Road and Highway 82 and recorded two new Wallowa County records:

*Sympetrum internum* (Cherry-faced Meadowhawk, OC# 409757), and *S. costiferum* (Saffron-winged Meadowhawk, OC# 409758).

### Twin Lakes

The second half of Blitz fun is in “the being there”. The ancient (in Oregon daylight savings geologic time) Wallowa Mountains are granitic, and massive ice-age glaciers left deeply carved valleys and rugged peaks; more than ten peaks rise above 9,000 feet elevation. The Twin Lakes are located on the Wallowa-Whitman National Forest on the Wallowas’ southern edge at about 6,400 ft. elevation. The campground is situated among spire-shaped pines and western larch and is home to Clark’s Nutcrackers, Red Crossbills, Mountain Chickadees, and Gray Jays. We quickly discovered that Williamson’s Sapsuckers were easy to find in the campground and along the lake shores. The granite cliffs and distant Wallowa Mountain peaks provided us with a beautiful dragonflying background. Numerous wildfires rendered the atmosphere brown, and the distant Wallowas bore a resemblance to the Great Smoky Mountains.



Twin Lakes, Oregon, 31 July 2012. Photo by Cary Kerst.

Both of the Twin Lakes are hourglass-shaped, with constrictions that make each twin appear to be two lakes. Steve Valley suggested that they be renamed “Twin Twin Lakes”. Ever the county lister, Jim Johnson quickly informed us that the gravel road bisecting the campground was the line between Wallowa and Baker Counties. What a perfect spot to work on county lists!

Upon arriving at Twin Lakes, Steve Valley obtained a new Baker County record for *Aeshna canadensis* (Canada Darner, OC# 403344). Jim Johnson found an ovipositing

female *A. tuberculifera* (Black-tipped Darner) at the Wal-lowa County Twin Lake, the third known Oregon loca-tion for this species. In addition to the two above species, the Oregon Dragonfly Survey recorded the following in our three days at Twin Lakes: *Aeshna palmata* (Paddle-tailed Darner), *A. interrupta* (Variable Darner), *Cordulia shurtleffii* (American Emerald), *Somatochlora semicircularis* (Mountain Emerald), *Lestes disjunctus* (Northern Spreadwing), and *Enallagma boreale* (Boreal Bluet).

Two-year old Xabrina Vlach was the highlight of the camp. This year she could walk, talk, smile, and eat as many fresh blueberries as we could place on her breakfast plate. At this high altitude in late August, the dawns are crisp, but not quite at the freezing level. On Sunday morning, we were surprised to see aeshnids flying in the wheel position in early dawn shadows at 6:45 am.

The last half of the Blitz fun is “the going home”. After leaving Twin Lakes on the 18th, Steve Gordon, Cary Kerst and Steve Valley headed south and scouted out the Pow-der River before driving on to an old gravel pit on the eastern edge of Baker City. There Steve Gordon collected *Anax junius* (Common Green Darner) exuviae and a dead, partially-emerged adult specimen for a new Baker County record, OC# 409756.

On Monday 18 August, Ron Lyons stopped at Brunneau Dunes State Park in Owyhee County, Idaho and added two new county records: *Rhionaeschna multicolor* (Blue-eyed Darner, OC# 403524), and *Tramea lacerata* (Black Saddlebags, OC# 403527). In addition, Ron added site-specific data for two old dot map records: *Pachydiplax longipennis* (Blue Dasher, OC# 403525), and *Sympetrum semicinctum* (Band-winged Meadowhawk, OC# 403526).

On 19 August, Steve Gordon, Cary Kerst, and Steve Val-ley continued into southeastern Oregon and stopped at Twin Springs in Harney County. There they observed *Libellula comanche* (Comanche Skimmer), *Argia alberta* (Paiute Dancer), and *Ischnura denticollis* (Black-fronted Forktail). They also witnessed interesting interchanges as *L. comanche* and *Erythemis collocata* (Western Pondhawk) challenged each other for favored perches along a hot springs rivulet.

After Steve Valley departed for home, Steve Gordon and Cary Kerst stopped in the Alvord Desert at Borax Lake and added *Libellula composita* (Bleached Skimmer) to the trip list. A visit to Mickey Hot Springs on the north-ern end of the Alvord resulted in the addition of a single female *Plathemis subornata* (Desert Whitetail), the only one for the trip. As we approached Mann Lake to camp, we saw a full-fledged wildfire-fighting operation on the



*Libellula comanche* (Comanche Skimmer), 19 August 2013. Photo by Cary Kerst.

steep eastern escarpment of Steens Mountain. Under a full moon we watched as another juniper tree would burst into flames like a distant torch. On 20 August, Steve counted thirty-one Sagebrush (formerly named Sage) Sparrows migrating southward through the campground.

During a drive down the Malheur National Wildlife Refuge Central Patrol Road, over a dozen Loggerhead Shrikes watched us from roadside perches. Throughout the drive, hundreds of aeshnids were hawking insects over the road. We did not attempt to net them on the refuge.


Driving through miles of sagebrush, Steve and Cary passed through Hart Mountain National Wildlife Refuge where they spotted Pronghorn Antelope. At the base of Warner Rim, they stopped at the Warner Wetlands. They both looked at a sign and thought it seemed odd that there would be a “Bison Range” in Oregon! Closer inspection of the sign yielded an explanation—an important bird-ing area in Oregon’s “Basin and Range” region. Along the Plush Cutoff Road, they saw two Greater Sage Grouse along the shoulder and nine Black-billed Magpies feeding on a dead Mule Deer carcass.

Steve and Cary camped at Mud Creek campground in the Warner Mountains on the Freemont-Winema National Forest, a beautiful spot with hooting Great Horned Owls silhouetted at dusk atop a pine snag and dozens of birds bathing in spring-fed fingers of Mud Creek. On the morning of 21 August, they drove south of Adel along Twentymile Creek and observed *Argia agrioides*, *A. lugens*, *A. nabuana*, and *A. vivida* (California, Sooty, Aztec, and Vivid Dancers). It was interesting to compare *A. agrioides* and *A. nabuana* wing venation color differences (see Johnson, J. 2010. Using Wing Vein Coloration to Iden-

tify *Argia agrioides* (California Dancer) and *A. nahuana* (Aztec Dancer). ARGIA 22(4): 19). Indeed, through binoculars and in hand, *A. nahuana* showed amber wing veins in contrast to a black costa where *A. agrioides* had black veins. This field mark proved true with every specimen we examined. It was also interesting to see different color variations of *A. agrioides*.

On 21 August, Steve and Cary camped at Cabin Lake campground north of Fort Rock. The next morning, they sat at photo blinds and were treated to flocks of Red Crossbills joined by other interesting species such as Pinyon Jay, Green-tailed Towhee, Western and Mountain Bluebirds,

and White-headed Woodpecker. Driving westward into a cold rain put a damper on odonates for the last day of the trip.

In total, 42 odonate species were recorded, with five new Oregon county records, two new Idaho county records, and discovery of a new Oregon location for *Aeshna tuberculifera*. The discovery of *Enallagma clausum* in the Columbia drainage was a significant find. In addition to Odonates, 138 bird species were recorded. But the real joy of the Blitz was visiting with each other in camp in the beautiful Wallowa Mountain setting. 

## Minutes of the 2013 Annual Meeting of the Dragonfly Society of the Americas

Steve Valley, Secretary <svalley2@comcast.net>

The annual meeting of the Dragonfly Society of the Americas was held on Saturday, 13 July 2013 in the Academic Center at the Saskatchewan Institute of Applied Science and Technology (SIASST), Prince Albert, Saskatchewan, Canada.

David Halstead, the host, welcomed attendees to the meeting. The member of the Legislative Assembly of Saskatchewan (Nadine Wilson) could not make the meeting, but she and the premier of the province were aware of our presence and were thrilled. Having this many people come to Prince Albert is rare and it's unusual for the city to get this national attention. Dave thanked the group for attending and pointed out the sponsors that supported this conference. Prince Albert Destination Marketing (hotels) funded the stay, decreasing room pricing and providing breakfast vouchers. Tourism Saskatchewan helped with monetary contributions and booking. SIASST sponsored the meeting supper and the meeting room.

Steve Hummel addressed us and welcomed us. As his last official act as president he introduced our new president, Jim Johnson. Jim thanked us and Dave Halstead. Jerrell Daigle handed out the meeting buttons. An attendance list was circulated. Attending members introduced themselves:

Tim Allison from Calgary, Alberta, Canada.  
April Baisan from Colorado.  
Mike Thomas from Connecticut.  
Erland Nielsen from Denmark.  
Jerrell Daigle and Buck Snelson from Florida.  
Marion Dobbs from Georgia.  
Steve and Marcia Hummel from Iowa.  
Yvette Liautaud, Kathy Kozacky, John & Cindy McKee and Marla Garrison from Illinois.

Joshua Rose from Massachusetts.  
Scott King from Minnesota.  
Tim Vogt from Missouri.  
Ailsa and Nick Donnelly and Fred & Peggy Sibley from New York.  
Byron Perry from North Carolina.  
Cary Kerst, Ron Lyons, Celeste Mazzacano, Max Steeprow and Steve Valley from Oregon.  
Charlie Brown from Rhode Island.  
David Halstead and Lorne Duczek from Saskatchewan, Canada.  
Chris Hill from South Carolina.  
Bryan Pfeiffer from Vermont.  
Paul Bedell and Oliver & Carol Flint from Virginia.  
Jim Johnson from Washington.  
Ken Tennessen from Wisconsin.

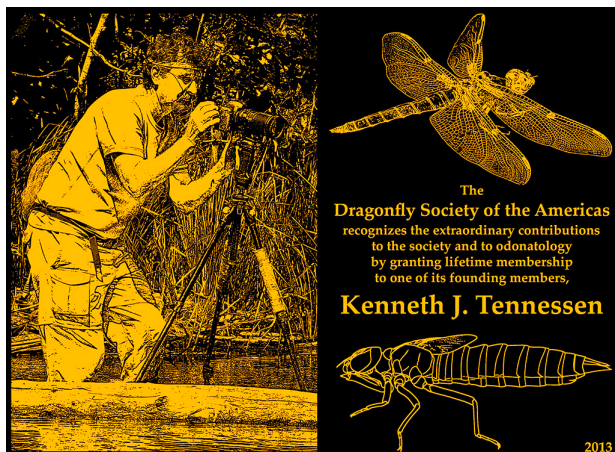
A motion to accept the minutes of the 2012 annual meeting as published in ARGIA 25(2) was made by Steve Valley. Jerrell Daigle seconded and the motion passed unanimously.

Steve Valley announced the election results. Voting was online and there were not a lot of votes. We will try to market that a little more in the future. Chris Hill is now the president-elect; Marla Garrison is now a regular member, replacing Natalia von Ellenreider; and Steve Hummel is the immediate past president for two years.

Jerrell gave the interim treasurer's report. We began 2013 with \$20,886.76 and have a membership of about 400 people. Income is lowered due to the new cost structure of electronic versions of ARGIA. Expenses included printing ARGIA #25 (the last issue to be printed on paper), incorporation fees, and annual business meeting expenses. In addition, we pay an annual fee of \$1,000 to the University

of Texas for the online storage of ARGIA and BAO on the OdonataCentral website. We end the year with approximately \$20,000. Jerrell will have the final copy online in the last issue of ARGIA.

Steve Valley asked to address the group. He told us about Ken Tennessen, whom he met 30 years ago at the 1983 SIO symposium in Calgary; they have been friends ever since. In 1989, Ken was one of the founders of DSA and he has published over 75 papers and described more than a dozen species, with many more to go. Steve presented Ken with a Lifetime Membership in DSA as well as a Lifetime Achievement Award in the form of plaque. Ken read the inscription aloud which stated “The Dragonfly Society of the Americas recognizes the extraordinary contributions to the society and to odonatology by granting lifetime membership to one of its founding members, Kenneth J. Tennessen”.



**Upper:** Steve Valley (L) presents Ken Tennessen (R) with DSA Lifetime Achievement Award. Photo by Ron Lyons.  
**Lower:** Award plaque. Photo by Steve Valley.

Jerrell Daigle asked for input from anyone who would like to host a meeting (although based on the fantastic job Dave did planning the Saskatchewan meeting, Bryan Pfeiffer jokingly proposed that we have him organize all future meetings).

Ken Tennessen talked of the upcoming 2014 meeting in Wisconsin, which he will host, and gave a PowerPoint presentation. The last annual meeting there was in 1991. He showed a map of the ecoregions of Wisconsin. The main meeting will be in Ladysmith, Wisconsin but we will survey the Chippewa River near the town of Bruce, where there are over 100 species in a 45 mile radius. The date will be 11–18 June 2014 (see the lead article in this issue for details).

Jerrell moved as the national meeting coordinator to accept Ken’s proposal, Steve Valley seconded, and it passed unanimously. Jerrell mentioned that Tim Vogt did a lot of work to get the first meeting in Grantsburg, Wisconsin started.

The Donnelly Fellowship was awarded to François Meurgey, but he was unable to attend.

Future meetings: Bryan Pfeiffer announced that the 2014 NE DSA regional meeting will be in Binghamton, New York on 26–29 June. Jerrell announced that the SE DSA meeting will be in Gainesville, Florida on 4–6 April 2014, to be hosted by Bill Mauffray, and we will be looking for *Cordulegaster sayi* (Say’s Spiketail).

Bill Mauffray has nothing to report through Jerrell Daigle for IORI. There was no report from Dennis Paulson on the Checklist Committee. OdonataCentral update via e-mail from John Abbott: John is leaving the University of Texas-Austin to become the Director of the Wild Basin Wilderness Preserve at St. Edward’s University in Austin, but he assured us that OdonataCentral will continue as normal without interruption. He will take all of the odonate specimens amassed at UT-A with him and they will be available. Cary Kerst asked about the new North America Dragonfly Manual, but at that point it was not certain when the book will become available.

Celeste Mazzacano took the floor as ARGIA editor-in-chief and reminded people to submit articles to her, not to the previous editor John Abbott. ARGIA is now available only online to keep dues down. This allows us to have more color photos, and issues can still be printed out with photos at 300 dpi if desired. She is also starting up a behavior photos feature for ARGIA. This is our news journal, not peer-reviewed, so please feel free to contact her and submit items.

Steve Hummel took the floor as editor of BAO, which is peer-reviewed and publishes more scholarly papers. He is

looking for more papers for the journal. BAO is still provided in both print and online versions, but does not accept color yet. Anyone who wants to help with reviewing articles before they are sent to Jim please let him know. If anyone is comfortable with math he would like help reviewing some of the articles that are a bit more complex in their analysis.

#### New Business Proposals:

Steve Valley addressed the possibility of a DSA mission statement. His initial suggestion for the mission was "DSA supports the advancement of knowledge of odonates through research, observation, photography and collecting". Steve wanted collection included because DSA was founded on this principle. This is a work in progress so if you have suggestions for a short, simple mission statement you can send them to him at <svalley2@comcast.net>. The Executive Committee will examine suggestions and the membership should eventually vote on maybe three statements selected by the EC.

Discussion: Someone said collecting may be a hot button alerting other organizations and people that might cause problems. John McKee suggested "the knowledge and appreciation" might be a better statement to broaden the education of the public and get more people involved. Marcia Hummel noted that if you are a tax-exempt organization the government wants to see a mission statement, which should be simple and encompass what we really do. Steve Valley said that throughout DSA's history there have been movements to ban collecting, so he wants this included in the statement. He emphasized that for scientific inquiry collections are essential. We should stand for this to create a history. Tim Allison suggested we include the word "ethical" with collecting. Byron Perry wondered whether we should include it in the mission statement at all if it is a lightning rod issue. April Baisan suggested that on the online website of a meeting we should go over the criteria and guidelines for collecting. Jim noted that the Collecting Guidelines are available on OdonataCentral.

The Executive Council members were recognized. The Original Founding Members in attendance (Jerrell Daigle, Nick Donnelly, Tim Vogt, Ken Tennessen, and Steve Valley) were recognized.

Dave Halstead proposed a registration fee of around \$20–25 to assist in planning the annual meeting. It would be helpful front-end money and get a commitment from people that they are actually coming. Organizers worry people will just 'drop in' since it is free (this could be a problem at a dinner where the number of attendees was pre-planned).

Discussion: Jerrell Daigle stated that we cannot charge

a fee. Multiple people stated that that was not the case. Dave mentioned incidental costs like photocopying, web design, etc. Dave formed his own local committee with its own bank account, etc. creating their own organization for the activities around the annual meeting. Steve Valley mentioned that it would not be paid into the DSA coffers. A lot of non-profits charge registration. Marcia Hummel questioned if the state in which you got non-profit status matters. Ken Tennessen mentioned again that the money does not go to the DSA treasurer. Nick Donnelly spoke in support of a fee because many people say they will come but don't. Ailsa Donnelly mentioned they will need to find hotel rooms for the upcoming NE meeting, and finding a hotel that will give you a conference room for free is not always possible. Jim Johnson asked if we currently do not reimburse for regional meeting costs, and Jerrell replied that we can reimburse only for those things associated with the business meeting. Bryan Pfeiffer supported the registration fee; he required a \$25 fee at a nymph blitz and still has a slush fund from that. Marla Garrison said that the registration fees may be able to go directly into the treasury account rather than needing separate accounts. John McKee, who is involved in non-profits, said as long as the money is being spent on our mission there was no problem. Cindy McKee agreed. Marian Dobbs mentioned some issues with the 2012 meeting, such as unclaimed t-shirts and that Chris Hill covered the barbeque and some funds came out of his pocket. Chris Hill supports more than a nominal fee. Dave Halstead said we should include a financial statement if we make a motion and that if we don't have a motion, then we should support in principle that autonomous groups could do this in support of the organization. Ollie Flint mentioned that the international meetings might be a problem. Jim Johnson is in favor of registration fees.


The Executive Council will discuss the fee proposal and look into IRS guidelines. Jim Johnson thought the EC should have a liaison with any local committee. Chris Hill asked if it was appropriate to second the motion in principle. Dave Halstead moved that "the DSA support, in principle, the idea that local autonomous committees could charge a registration fee to assist in the planning and organization of associated survey activities; this is not meant to cover the formal annual meeting".

Bryan Pfeiffer reported that he would welcome stories about your encounters with *Pantala flavescens* (Wandering Glider) for a book he's writing. He is also collecting stories about peoples' insect dreams for an ARGIA article. He noted that they are looking at Delaware for the 2015 meeting, possibly in the pine barrens, possibly in Pennsylvania where they want a survey done. If you have any suggestions, please talk to him.

Marla Garrison proposed a potential meeting in Costa Rica in 2–3 years; multiple people would be interested (plans are moving ahead for a meeting in 2015).

Steve Hummel asked if there was support for a midwest DSA meeting. Nick Donnelly mentioned GLOM (Great Lakes Odonata Meeting), and Yvette Liautaud said that GLOM was dead. Nick Donnelly said a midwest meeting brought in Canadians. Scott King asked if a Great

Plains regional meeting would be better. Kathy Kozacky mentioned how limited GLOM was in its range. Ken Tennesen said Wisconsin just formed its own Dragonfly Society. Ken said there is talk amongst the Wisconsin Society wondering if they can hold their annual meeting in conjunction with the DSA annual meeting.

Jim Johnson made a motion to adjourn the meeting, Bryan Pfeiffer seconded; the motion passed unanimously. 

## Note on the Distribution of *Progomphus bellei* Knopf and Tennesen, 1980 (Belle's Sanddragon) in Bay and Washington Counties, Florida, U.S.A.

Edwin J. Keppner, 4406 Garrison Road, Panama City, Florida 32404 <ekeppner41@gmail.com>

### Abstract

I conducted a survey for *Progomphus bellei* (Belle's Sanddragon) at 52 water bodies in Bay and Washington counties in Florida from 2007–2013. *P. bellei* was found at 29 locations: three in Bay County and 26 in Washington County. Two additional records from Bay County and one from Washington County were provided by others for a total of 32 locations (five in Bay County and 27 in Washington County).

### Introduction

Knopf and Tennesen (1980) described adult *Progomphus bellei* (Belle's Sanddragon) from Calhoun, Leon, Liberty, and Santa Rosa Counties in Florida and Bladen County in North Carolina. They designated the type locality as Calhoun County, Florida in the vicinity of the State Route 20 crossing of Juniper Creek. Tennesen (1993) described the nymphs of *P. bellei* from specimens obtained in Calhoun, Leon, and Liberty counties, Florida, and provided a key to the nymphs of *Progomphus* in North America. Tennesen *et al.* (1995) provided a record of *P. bellei* from Escambia County, Alabama, and the Northern Prairie Wildlife

Research Center (2012) has *P. bellei* locations in Escambia and Covington counties, Alabama as well as in Florida. The flight season of *P. bellei* in Florida is April to August (Knopf and Tennesen, 1980; Dunkle, 1994).

Florida Natural Areas Inventory (2013), the Heritage Program for Florida, lists *P. bellei* as G3S3, defined as either very rare or local in Florida (21–100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors. The Florida Fish and Wildlife Conservation Commission (2012) included *P. bellei* as a Species of Greatest Conservation Need (SGCN) and listed it as Vulnerable.

Paulson (2009) provided a discussion of the threats to this species for the International Union for the Conservation of Nature (IUCN) and stated small populations of *P. bellei* occur in scattered habitats, only 10 locations were provided in recent years, and the species habitat is susceptible to possible development. He also recommended research into all aspects of its biology, and identification of more protected areas. The IUCN (2013) listed *P. bellei* as near-threatened.

My objective was to search for *P. bellei* adults and/or nymphs at locations in Bay and Washington counties, Florida to provide additional data for assessment of the species' degree of imperilment. The survey was conducted from 2007–2013, with emphasis on the karst region of the two counties.

### Survey Area

Bay and Washington counties are located in the Panhandle of Florida (Figure 2). Keppner (2012) discussed the physiography of both counties, and Keppner (2013) discussed the ravine systems in the karst region. The karst



Figure 1. *Progomphus bellei* (Belle's Sanddragon), Porter Pond, Washington County, Florida. Photo by Ed Keppner.

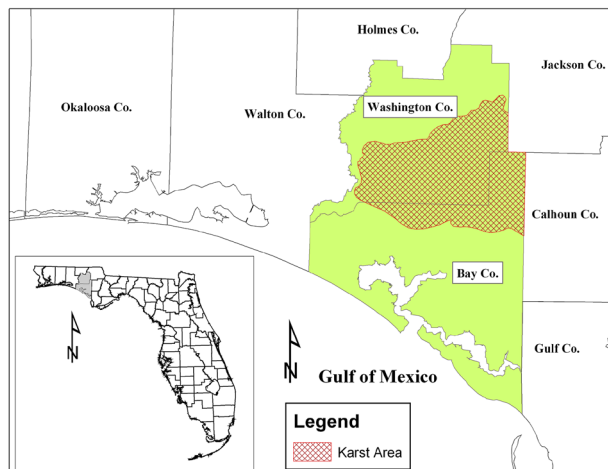


Figure 2. Location of Bay and Washington counties in the Florida Panhandle showing survey area.

region of southern Washington and northern Bay counties is an area of deep, well-drained sandy soils with a large number of clear-water, sand-bottom sinkhole lakes and ponds and small sand-bottom seepage streams. There is usually a xeric to mesic hardwood forest on the slopes to the water bodies, and a shrub area downslope of the hardwood forest consisting of the endemic smoothbark St. John's-wort (*Hypericum lissophloeus*). The xeric uplands are dominated by sand pine (*Pinus clausa*) silviculture.

The water level in the predominantly sand-bottom lakes and ponds fluctuates greatly with the amount of rainfall. By the end of 2012, the recent prolonged drought resulted in numerous dry lakes and ponds or surface water reduced to a small area over black organic sediment. Most of the sand-bottom seepage streams continued to flow during the drought. Rainfall in 2013 that was well above average restored normal to above-normal water levels to the lakes and ponds.

Flatwood lakes and ponds also occur in both counties, and some have sandy patches along the predominantly organic shore line that supported nymphs and adults of *P. bellei*. These lakes and ponds are dominated by pond cypress (*Taxodium ascendens*), swamp titi (*Cyrilla racemiflora*), and black titi (*Cliftonia monophylla*).

## Methods

I searched for *P. bellei* adults and nymphs primarily at sand-bottom lakes and ponds, along a few small sand-bottom streams, and in patches of sand along the shoreline of lakes and ponds with predominantly organic sediment and shorelines. Adults were collected with an aerial insect net, killed in acetone or in a killing jar with ethyl acetate, soaked in acetone, dried, and placed in plastic

envelopes with a data card. Nymphs were collected with a dip net and preserved in 70% isopropyl alcohol. Adults and nymphs were identified using the keys in Knopf and Tennesen (1980), Needham *et al.* (2000), and Richardson (2003). Plant names are from Wunderlin and Hansen (2011).

Collection locations were recorded with a Garmin GPS-map 76CSx, and each positive location represents a separate body of water. All specimens are in my collection except for those in Dr. Neil Lamb's collection. The locations for *P. bellei* will be placed in the Florida Natural Areas Inventory (FNAI) database except for those on private properties whose owners do not wish exact locations on their property recorded officially.

## Results and Discussion

### Habitat

I collected *P. bellei* adults and nymphs at sand-bottom streams and sand-bottomed lakes and ponds with predominantly sandy shorelines and from some sandy patches along flatwoods water bodies with predominantly black, organic bottoms and shore lines.

Knopf and Tennesen (1980) stated *P. bellei* was taken from

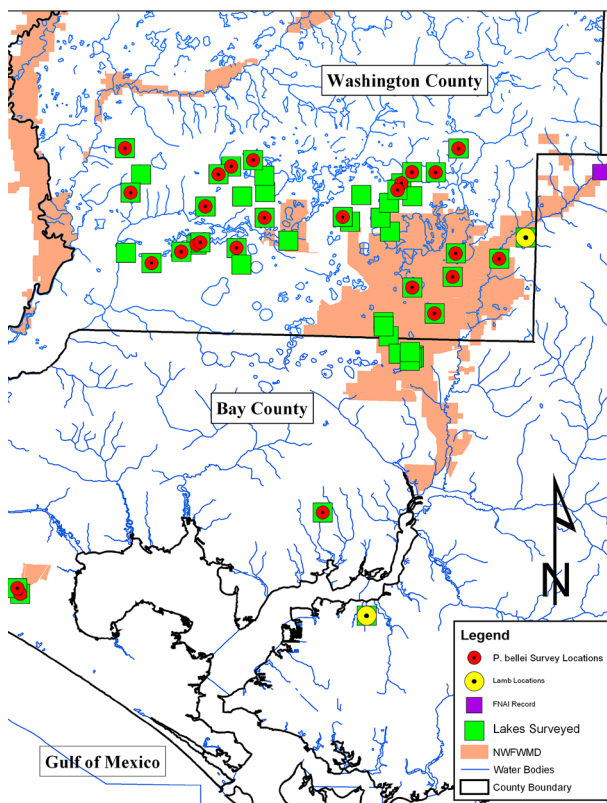


Figure 3. *P. bellei* locations in Bay and Washington counties.

a sand-bottom beaver pond, small sand-bottom tributaries in roadside ditches, and permanent sandy trickles in the area of the type locality. They also collected it at clear-water, sand-bottom lakes in the Florida Panhandle such as Mystic Lake in Liberty County.

Dunkle (2000) described the habitat as sand-bottom lakes or open sandy spring-fed trickles, and Paulson (2011) described the habitat as open sand-bottom lakes in forested landscape and where small forest streams on sandy soils emerge into sunny openings. Dunkle (1994) stated the nymphs are excellent burrowers in sand and leave a distinct V-shaped track, and Needham *et al.* (2000) described the nymphs of *Progomphus* species as adept burrowers living in the sandy beds of streams and lakes.

### Locations for *P. bellei*

*Progomphus bellei* was found or reported from 32 of 52 (62%) water bodies in the survey area (Figure 3). I collected adults and/or nymphs from 29 of the 52 locations (three in Bay County and 26 in Washington County). FNAI (2012) and Lamb (pers. comm. 2011) each provided an additional location for Bay County and Lamb (2011 pers. comm.) provided an additional location in Washington County for a total of five locations in Bay and 27 in Washington counties. The return of surface water to the water bodies that were dry during the survey may provide additional habitat for *P. bellei*.

Three of the locations were small, clear, unnamed sand-bottom seepage streams in Washington County and one location provided by FNAI was at Econfina Creek in Bay County. The remaining locations were at lakes and ponds. The earliest that I observed adult *P. bellei* was on 11 May 2012 at the Panama City Beach Conservation Park in Bay County, and the latest was 2 September 2012 at Gin Lake in Washington County.

**Bay County:** In Bay County, nymphs and adults were abundant at stormwater retention pond #14 on State Route 77 at 2008 and 2009 collections. The bottom was sand and some silt with a few emergent herbaceous plants. Adult *P. bellei* were collected at two locations in the Panama City Beach Conservation Park in May 2012. The habitat at the first location was a small sand-bottom artificial pond and the second location was a sand-bottom, slow-flowing artificial drainage to a cypress pond.

Lamb (pers. comm. 2011) collected an adult male in Bay County at a freshwater pond in Lynn Haven, Florida, and FNAI (2012) provided a record from Econfina Creek, on Northwest Florida Water Management District (NWF-WMD) land. I have visited the location twice and col-

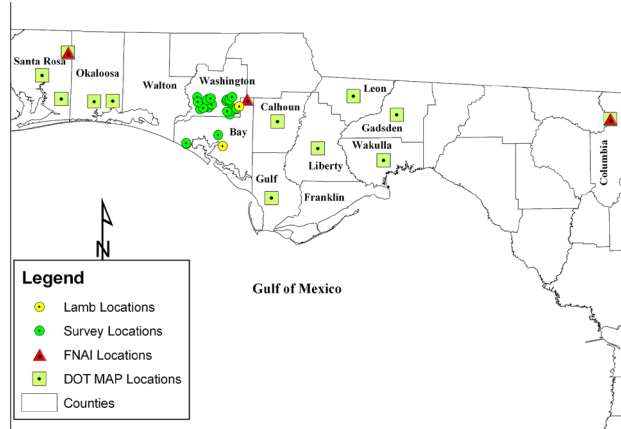


Figure 4. Florida counties of record for *P. bellei*.

lected only nymphs and adults of *Progomphus obscurus* from the edge of the main channel and the mouth of the narrow seepage stream north of the Scott's Road bridge over the creek.

**Washington County:** Locations on NWFWMD land were Grisset Pond, Porter Pond, Whitewater Lakes, Hammock Lake, Rattlesnake Lake, and Roach Lake. Hicks Lake is surrounded by private land, and the location for *P. bellei* is at the public launch ramp. These are clear-water, sand-bottom lakes and ponds with sandy shorelines, usually with smoothbark St. John's-wort (*Hypericum lissophloeus*).

Adults and nymphs were also collected at Litard Log Pond, Little River Pond, Gin Lake, and Gap Pond. These are clear-water flatwoods lakes and ponds with primarily black, organic bottoms and shore lines, but small patches of sandy shoreline are intermixed with the organic areas. Adults and nymphs of *P. bellei* were collected at an additional 11 sand bottom lakes and ponds and three small, unnamed sand-bottom seepage streams on private property in Washington County for a total of 14 locations. Lamb (pers. comm. 2011) collected adults and exuviae of *P. bellei* in Washington County from Hammond Lake, a private sand-bottom lake.

**Distribution in Florida:** Knopf and Tennessen (1980) reported *P. bellei* from Mystic Lake in Liberty County, Lake Bradford in Leon County, and Riley's Landing in Santa Rosa County, in addition to the type locality. Tennessen (1993) described nymphs from the Juniper Creek type locality in Calhoun County and Silver Lake in Leon County.

Abbott (2013) has records of *P. bellei* at 15 locations in 10 Florida counties. The location in Bay County was submitted by me (Figure 4). FNAI (2012) has records of *P. bellei* from five locations in four Florida counties, of which the



Bay County and Washington County locations were submitted by me. Richardson (2003) provided records of *P. bellei* nymphs from eight Florida counties but did not provide specific locations. Including the locations provided by this survey and by Lamb, *P. bellei* occurs at about 50 locations in 11 Florida counties (Bay, Calhoun, Columbia, Gadsden, Gulf, Leon, Liberty, Okaloosa, Santa Rosa, Washington, and Wakulla). Bay and Washington counties currently have largest number of recorded locations for *P. bellei* in Florida.

### Acknowledgements

I thank my wife Lisa for accompanying me on field trips and collecting numerous specimens. I thank Mr. Jerrell Daigle for confirming adult identifications and Dr. Kenneth Tennessen and Mr. R. Stephen Krotzer for verifying the identification of nymphs. Dr. Neil Lamb provided permission to include his records. Dr. John Himes and Ms. Diana Pepe provided valuable assistance in collecting specimens. I also thank the Northwest Florida Water Management District and the private property owners for permission to collect on their property.

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## Request for Future DSA Annual Meeting Proposals

If you or someone you know would like to host a DSA annual meeting in the northeast (2015), northwest (2018), or central USA (2019), please let me know. If you have any questions at all about what is involved in planning a meeting or what the desired location aspects are, please contact me at <jdaigle@nettally.com>. Thank you very much!

Jerrell J. Daigle

## Distribution and Relative Abundance of *Gomphus dilatatus* (Blackwater Clubtail) at the Northern Limit of its Range in Virginia

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*Gomphus dilatatus* (Blackwater Clubtail) is a large gomphid endemic to the southeastern United States. Its known published range extends from North Carolina south to Florida and west to Tennessee and Louisiana (Donnelly, 2004; Needham *et al.*, 2000; Paulson, 2011). Carle (1982) treated *G. dilatatus* as a hypothetical species for Virginia because of its occurrence in neighboring North Carolina, but stated “This coastal plain species doubtfully occurs in Virginia.” During the past decade, Allen Bryan and I independently discovered that the range of *G. dilatatus* extends north into Virginia. Several other local collectors or observers have subsequently documented additional records in the state. This new state record was first reported in early June 2011 on Allen Bryan’s website <[www.visitingnature.com/gomphusdilatatus.htm](http://www.visitingnature.com/gomphusdilatatus.htm)>, and OdonataCentral (Abbott, 2007–2013) currently includes a record from 1 June 2011 submitted by him from Fluvanna County. The collective records (specimens and photographs) of all observers reveal that *G. dilatatus* inhabits at least seven rivers (Appomattox, James, Mattaponi, Nottoway, Pamunkey, Rivanna, and Willis) in two physiographic provinces (Coastal Plain and Piedmont) of Virginia, and its abundance ranges from uncommon to common along these Atlantic Slope rivers.

Adults of *G. dilatatus* are superficially similar to the significantly smaller *G. vastus* (Cobra Clubtail; see comparative photos on website cited above), a much more abundant species in Virginia, particularly along the James River, where it is the most abundant dragonfly. Available records indicate that the flight season of *G. dilatatus* in Virginia extends from at least 2 May to 12 July, although the former date (James River record) may be atypical owing to the unusually mild winter and warm spring during 2012. In six other years between 2006 and 2013 for which I have data, my first record of emergence from the James River ranged from 16 to 25 May (mean = 19 May). In 2013, I found *G. dilatatus* exuviae on the Nottoway River, a more southern drainage, as early as 11 May, two weeks before my first observation on the James that year. Emergence continues into early June.

Evidently, the first record of *G. dilatatus* from the James River was obtained on 16 May 2006, when I collected a fresh exuvia within the city of Richmond. The next day I collected three recently emerged teneral adults with their associated exuviae as well as several additional exuviae at another site in Richmond about two miles upstream.

Adults or exuviae (plus one larva collected by Jim Childress on 7 October 2010 at Warren) have since been collected from at least 13 sites along the James River ranging from Richmond upstream (west) to at least Warren (Albemarle County), a linear distance of 60 miles (96 km) and spanning approximately 100 miles (160 km) of the river’s length. To date, *G. dilatatus* has been documented from seven counties (Albemarle, Buckingham, Chesterfield, Cumberland, Fluvanna, Goochland, and Powhatan, plus the city of Richmond) that border the James River. The species surely occurs in Henrico County also, with eventual documentation being a mere formality, because it has been recorded directly across the river in Chesterfield County as well as at multiple sites along the same (north) shoreline both upstream (Goochland Co.) and downstream (Richmond). I have collected upwards of 30 *G. dilatatus* exuviae per visit at some sampling sites (typically 50–150 meters of shoreline) along the James River, although *G. vastus* is far more abundant at all sites (hundreds to thousands of exuviae present in the same sections of shoreline). Allen Bryan and I have also independently documented *G. dilatatus* along the Rivanna River, a tributary of the James River, in Fluvanna County. In addition, I have collected exuviae from two other tributaries of the James River (Appomattox River, Amelia Co., 24 May 2011, n=3; Willis River, Cumberland State Forest, Cumberland Co., 24–25 May 2011, n = 7).

My collections of exuviae indicate that *G. dilatatus* is common in late spring along the Nottoway River (part of the Chowan River drainage) in southeastern Virginia. Of 162 dragonfly (Anisoptera) exuviae that I collected on 25 May 2012 at a bridge crossing site in Sussex County, *G. dilatatus* (n=50) was the second most abundant species after *G. vastus* (n=77), these two species collectively accounting for 78% of the total exuviae. Later that same day, I collected 78 exuviae of nine dragonfly species at a site farther downstream in adjacent Southampton County, nearly half (n=35, or 45%) of which were *G. dilatatus*. I have collected more than 40 *G. dilatatus* exuviae in 1–2 hour surveys at several other sites along the Nottoway River in late May or early June. Typically, it was the second or third most abundant species, trailing only *Dromogomphus spinosus* (Black-shouldered Spinyleg) and/or *G. vastus*, and accounted for 18–35% of the total exuviae in each sample. My collections of exuviae from the Nottoway River confirm the occurrence of *G. dilatatus* in at least five counties: Brunswick, Dinwiddie,

Greensville, Southampton, and Sussex. Other observers have recently observed or collected adults in two of these counties (Dinwiddie and Sussex). *Gomphus dilatatus* probably occurs farther east in the Blackwater River, which joins the Nottoway River at the Virginia-North Carolina border to form the Chowan River, but my rather limited observations and collections to date from this river do not include *G. dilatatus*, with *D. spinosus* being by far the most abundant species as judged by the number of exuviae.

*Gomphus dilatatus* also inhabits at least two tributaries of the York River, the first major drainage north of the James, in Virginia. On 23 June 2012, I collected six *G. dilatatus* exuviae from the Mattaponi River near Bowling Green in Caroline County. This is currently the northernmost known record for this species rangewide. This collection date was probably 3–4 weeks after the emergence period of *G. dilatatus*, and several exuviae exhibited obvious signs of deterioration. *Dromogomphus spinosus* was by far the most common species in my sample of exuviae collected that day. Cognizant of the apparently widespread distribution of *G. dilatatus* in Virginia based on records obtained entirely since 2006, I decided to examine some unidentified samples of exuviae that had been collected in prior years. Among these was a collection of 83 Anisoptera exuviae obtained on 14 June 1999 by me and Anne Chazal from the Pamunkey River at the US Route 301 bridge straddling the Caroline-Hanover county line. The family Gomphidae accounted for 10 of 13 species and 77 (93%) of the exuviae, 17 of which are referable to *G. dilatatus*, thus apparently being the first Virginia collection of this species. Extensive sampling of the North Anna and South Anna rivers, which converge to form the Pamunkey River approximately 10 km upstream of the US Route 301 bridge, during the 1970s by entomologists associated with Virginia Polytechnic Institute and State University did not yield any records of *G. dilatatus* (see Voshell and Simmons, 1978; Carle, 1982).

The current known county (and city) distribution of *G. dilatatus* in Virginia is shown in Figure 1. To date, the species has been documented from 15 counties and the city of Richmond. Additional sampling in the eastern portion of the state will undoubtedly yield more county records, perhaps doubling the current number. Whether *G. dilatatus* has been present in Virginia for many years and was simply overlooked or undersurveyed in the past, or is a recent arrival as a result of a northward range expansion or shift associated with climate warming, cannot be readily determined at this time.

The same questions pertain to the recent discovery of *G. hybridus* (Cocoa Clubtail), another southeastern U.S. species, along the Nottoway River in southeastern Virginia (Roble and Bedell, 2013). *Gomphus dilatatus* was recorded

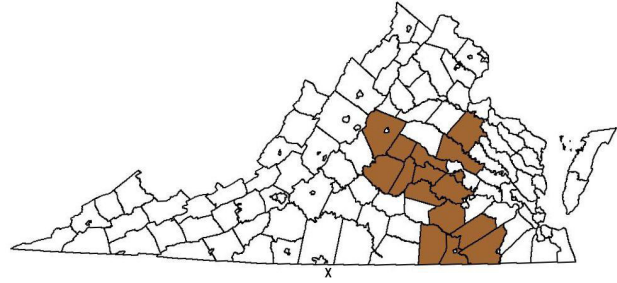


Figure 1. Known county distribution of *Gomphus dilatatus* in Virginia. The X (bottom middle) marks the general location of Yanceyville, Caswell County, North Carolina, where the species was collected in 1985 by Duncan Cuyler (LeGrand *et al.*, 2013).

from 13 counties in North Carolina during the dot-map project (Donnelly, 2004; OdonataCentral web site <[www.odonatacentral.org](http://www.odonatacentral.org)>), almost entirely based on the extensive statewide collecting efforts of the late Duncan Cuyler (Donnelly, pers. comm.). OdonataCentral shows only one new county record (Mecklenburg Co., North Carolina, near the border with South Carolina), but the new North Carolina Odonata website (LeGrand *et al.*, 2013; <[www.dpr.ncparks.gov/odes/a/accounts.php](http://www.dpr.ncparks.gov/odes/a/accounts.php)>) includes several additional recent photographic and sight records. The nearest documented record in northeastern North Carolina to the Nottoway River in Virginia is from Edgecombe County (Donnelly, 2004; OdonataCentral), which is three counties south of the Virginia border. LeGrand *et al.* (2013) report that this record is based on a specimen (Florida State Collection of Arthropods) captured by Cuyler in 1987. Their website also includes an apparently reliable sighting made by LeGrand in May 2011 farther to the northeast from the Roanoke River straddling the Bertie-Martin county line.

The northernmost North Carolina record for *G. dilatatus* is from Caswell County (Donnelly, 2004; LeGrand *et al.*, 2013), which borders the City of Danville and portions of two counties (Halifax and Pittsylvania) in Virginia. This record is based on another FSCA specimen that Cuyler collected on 20 June 1985 near Yanceyville (LeGrand *et al.*, 2013). This location is farther west than the southernmost Virginia records reported above (see X symbol on map in Figure 1), suggesting that the Dan, Hyc0, Meherrin, and Roanoke rivers, and perhaps large streams, in the southern Piedmont region of Virginia should be surveyed for this species. Four collections of exuviae that I made during 5–7 June 2012 from long stretches (up to 1 km) of both the north and south forks of the Mayo River, which converge at the Virginia-North Carolina border one county (Henry) farther west in the southern Piedmont, do not include *G. dilatatus*. The density of Anisoptera exuviae was very low compared to the James and Nottoway rivers, with *D. spinosus* being by far the most abundant species in these samples, followed by *Hagenius brevistylus* (Dragonhunter).

It will be interesting to see if *G. dilatatus* is eventually found in river systems north of the York (*i.e.*, Rappahannock, Potomac), thereby providing better evidence of a northward range shift or expansion. The Rappahannock River (Virginia) has been poorly sampled to date, but extensive historical and recent surveys of the Potomac River (which forms the Virginia-Maryland border) have not detected this species (Donnelly, 1961; Orr, 1996, 2005, 2008, and pers. comm.).

Voucher specimens (primarily consisting of exuviae to date) have been or will be deposited in the collections of the National Museum of Natural History (Smithsonian Institution, Washington, D.C.), Virginia Museum of Natural History (Martinsville, Virginia), and Virginia Department of Conservation and Recreation, Division of Natural Heritage (Richmond, Virginia).

### Acknowledgments

I thank Paul Bedell, Allen Bryan, Anne Chazal, Jim Childress, and Chris Hobson for sharing their records of *G. dilatatus* with me.

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### Advice Column

Never fail to send a friendly and innocent wave to someone on whose property you are likely trespassing.

Be ready to assume your mantle of utter harmlessness when the deputy sheriff's car pulls off the road. He or she will want to know what you are doing in the middle of a stream with what appears to be a broom in your hands.

Always remember that, in addition to looking weird, you may be viewed as suspicious. I am reminded of a story from a birder friend who was doing some surveying on back country roads. He stopped the car to get out with his binoculars and check on something that looked interesting and had flown into a tree in a local resident's yard. He stared long and hard into the tree without luck and so began to peer here and there about the yard. Soon a large pickup arrived on the scene, and a large man got out and strode up to my friend and said...“Mama says you lookin' in her winder.”

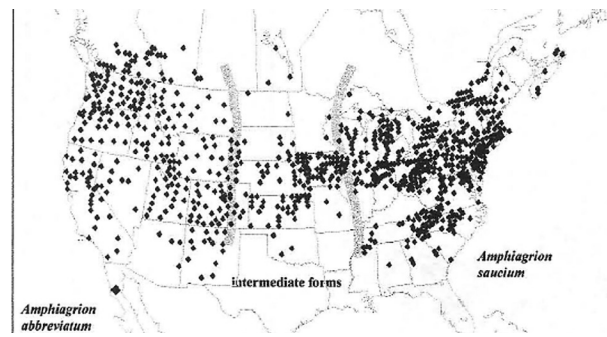
Marion Dobbs

## *Amphiagrion* (Red Damsel) Update

Jerrell J. Daigle <jdaigle@nettally.com> and Erik Pilgrim <Pilgrim.Erik@epa.gov>

While *Amphiagrion abbreviatum* (Western Red Damsel) and *A. saucium* (Eastern Red Damsel) appear morphologically distinct in the extreme ends of their distribution, some workers feel there is an intermediate form or third species in the Great Plains and central U.S. Based on our DNA barcode testing of recently collected specimens (less than 10 years) contributed to the project from 15 states around the U.S., I believe two species occur in North America. There are no genetic difference between *Amphiagrion abbreviatum* from Oregon, California, and Nebraska, and those *Amphiagrion* from Wisconsin, Illinois, and Indiana. *Amphiagrion* from western Ohio, Michigan, and Tennessee show no genetic differences compared to *A. saucium* from New York and Vermont. Using Nick Donnelly's *Amphiagrion* Dot map (right), I would extend the range of *Amphiagrion abbreviatum* to the Indiana/Ohio border. If

anyone has recent specimens from the Ohio River Valley and Central U.S. (i.e. taken within the past 10 years), we would like to see and test them. If anyone has any questions, please contact me at <jdaigle@nettally.com>. Thanks!



*Amphiagrion* (Red Damsel) Dot Map.

## What Can We Learn from Incorrect Determinations of Adult Odonata in an Upper Midwestern University Insect Collection?

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In March 2008, we vetted previously determined specimens and identified undetermined specimens of adult Odonata in the University of Minnesota Insect Collection. The collection contained a mixed assortment of pinned specimens and specimens in envelopes. Most had been previously determined by a number of entomologists going back to 1891. As we vetted the specimens we attached small, brightly colored slips of paper to the pins and in the envelopes of those that were incorrectly determined so that at a later time someone could easily look through the collection and make the necessary corrections to the Odonata database. While doing the work we were impressed with the overall accuracy of the previous determinations in almost all genera, especially considering that many of the determinations were made long ago when dichotomous keys to species of North American Odonata were not nearly as accurate or complete as they are now. However, we found slightly more errors in the genus *Sympetrum* (Meadowhawks), which was hardly surprising, in the genus *Leucorrhinia* (Whitefaces), and with some of the corduliids (Emeralds).

Individually, we often teach others how to identify Upper Midwestern Odonata, so we were curious about what could

be learned from our experience. Therefore, a few months later RBD returned to the collection and tallied the numbers of pinned specimens that had previously been correctly determined and incorrectly determined for each species represented by more than one specimen (except the family Lestidae [Spreadwings], which was inadvertently overlooked). Because visually scanning trays of pinned specimens to tally correctly and incorrectly determined specimens was a much quicker and more efficient method of data collection than opening individual envelopes to search for colored slips of paper, we focused only on pinned specimens for most genera. However, because we suspected that an analysis of the genus *Sympetrum* might be particularly insightful, we tallied the enveloped specimens in addition to the pinned specimens for that genus and recorded the gender of incorrectly determined individuals.

The results affirmed our original assessment that the entomologists who had made the previous determinations had done admirably detailed and accurate work. The percentage of correct determinations equaled or exceeded 99% for six of the eight families examined, with three families error-free (Table 1). We were particularly surprised with

the great accuracy of determinations of the coenagrionids (Pond Damsels), with only 8 misdeterminations among 748 specimens. Overall, 97% of the 3,565 Odonata specimens tallied had been correctly determined.

Of the two families containing problematic genera, the corduliids overall showed a good record of correct determinations (95% correct; Table 1) despite the great similarity of species within *Somatochlora* (Striped Emeralds) and *Epitheca* (Baskettails), and including *Cordulia shurtleffi* (American Emerald), which was twice misdetermined as a species of *Epitheca*. All of the errors among the corduliids involved

the genus *Epitheca*, with four specimens of other genera incorrectly determined as species within that genus, and three specimens within the genus incorrectly determined to species (Table 2). The taxonomy of *Epitheca* has long been problematic and remains so to the present (e.g. Donnelly, 1992). Paulson (2011, p. 384) stated, “Some *Tetragoneuria* are frustratingly similar in structure and variable in wing patterns, which vary geographically as well as individually. Field identification is almost impossible for most species, as all are colored essentially the same, and they present difficulties even in hand.” Authors’ note: The American species of *Epitheca* are separated by some workers into two genera,

**Table 1.** Accuracy of determinations of adult Odonata, by genus and family, in the University of Minnesota Insect Collection (specimen genders combined).

Taxon	Correct Determinations	Incorrect Determinations	% correct
<i>Calopteryx</i> (Jewelwings; 2 species)	285	2	> 99
<i>Hetaerina</i> (Rubyspots; 2 species)	138	0	100
<b>Calopterygidae Total</b>	<b>423</b>	<b>2</b>	<b>&gt; 99</b>
<i>Argia moesta</i> (Powdered Dancer)	24	0	100
<i>Amphiagrion</i> (Red Damsels; 2 spp.)	83	0	100
<i>Coenagrion</i> (Eurasian Bluets; 2 spp.)	13	1	93
<i>Enallagma</i> (American Bluets; 11 spp.)	269	4	99
<i>Ischnura</i> (Forktails; 2 species)	206	2	> 99
<i>Nehalennia irene</i> (Sedge Sprite)	145	1	> 99
<b>Coenagrionidae Total</b>	<b>740</b>	<b>8</b>	<b>99</b>
<i>Aeshna</i> (Mosaic Darners; 8 spp.)	221	0	100
<i>Anax junius</i> (Common Green Darner)	129	0	100
<i>Basiaeschna janata</i> (Springtime Darner)	11	0	100
<i>Boyeria</i> (Spotted Darners; 2 spp.)	14	0	100
<b>Aeshnidae Total</b>	<b>375</b>	<b>0</b>	<b>100</b>
<i>Arigomphus</i> (Pond Clubtails; 2 spp.)	20	0	100
<i>Dromogomphus spinosus</i> (Black-shouldered Spinyleg)	12	0	100
<i>Gomphurus</i> (Clubtails; 5 species)	61	1	98
<i>Hylogomphus</i> (Clubtails; 2 species)	19	0	100
<i>Phanogomphus</i> (Clubtails; 5 species)	100	1	99
<i>Hagenius brevistylus</i> (Dragonhunter)	27	0	100
<i>Ophiogomphus</i> (Snaketails; 5 spp.)	57	0	100
<i>Stylurus amnicola</i> (Riverine Clubtail)	2	0	100
<b>Gomphidae Total</b>	<b>298</b>	<b>2</b>	<b>&gt;99</b>

Table 1, continued

Taxon	Correct Determinations	Incorrect Determinations	% correct
<i>Cordulegaster</i> (Spiketails; 2 spp.)	8	0	100
<i>Zoraena diastatops</i> (Delta-spotted Spiketail)	1	0	100
<b>Cordulegastridae Total</b>	<b>9</b>	<b>0</b>	<b>100</b>
<i>Didymops transversa</i> (Stream Cruiser)	8	0	100
<i>Macromia illinoensis</i> (Swift River Cruiser)	8	0	100
<b>Macromiidae Total</b>	<b>16</b>	<b>0</b>	<b>100</b>
<i>Cordulia shurtleffi</i> (American Emerald)	4	2	67
<i>Dorocordulia libera</i> (Racket-tailed Emerald)	19	0	100
<i>Epitheca</i> (Baskettails; 4 spp.)	78	3	96
<i>Somatochlora</i> (Striped Emeralds; 6 spp.)	20	2	91
<b>Corduliidae Total</b>	<b>121</b>	<b>7</b>	<b>95</b>
<i>Celithemis</i> (Small Pennants; 2 spp.)	54	0	100
<i>Erythemis simplicicollis</i> (Eastern Pondhawk)	66	0	100
<i>Leucorrhinia</i> (Whitefaces; 5 spp.)	151	19	89
<i>Ladona julia</i> (Chalk-fronted Corporal)	82	0	100
<i>Libellula</i> (King Skimmers; 5 spp.)	336	0	100
<i>Nannothemis bella</i> (Elfin Skimmer)	4	0	100
<i>Perithemis tenera</i> (Eastern Amberwing)	28	0	100
<i>Pachydiplax longipennis</i> (Blue Dasher)	53	0	100
<i>Pantala</i> (Rainpool Gliders; 2 spp.)	92	0	100
<i>Sympetrum</i> (Meadowhawks; 8 spp.)	603	76	89
<b>Libellulidae Total</b>	<b>1,469</b>	<b>95</b>	<b>94</b>

**Table 2.** Accuracy of determinations of adult Corduliidae in the University of Minnesota Insect Collection (genders combined).

Taxon	# of Specimens	# of Correct Determinations	Incorrect Determinations as the Taxon	% Correct
<i>Cordulia shurtleffii</i> (American Emerald)	6	4	1 <i>E. canis</i> 1 <i>E. cynosura</i>	67
<i>Dorocordulia libera</i> (Racket-tailed Emerald)	19	19	0	100
<i>Epithea canis</i> (Beaverpond Baskettail)	12	11	1 <i>E. spinigera</i>	92
<i>E. cynosura</i> (Common Baskettail)	38	38	0	100
<i>E. princeps</i> (Prince Baskettail)	19	19	0	100
<i>E. spinigera</i> (Spiny Baskettail)	12	10	1 <i>E. canis</i> 1 <i>E. cynosura</i>	83
<i>Somatochlora elongata</i> (Ski-tipped Emerald)	2	2	0	100
<i>S. ensigera</i> (Plains Emerald)	1	0	1 <i>E. cynosura</i>	0
<i>S. forcipata</i> (Forcipate Emerald)	2	2	0	100
<i>S. kennedyi</i> (Kennedy's Emerald)	2	2	0	100
<i>S. walshii</i> (Brush-tipped Emerald)	7	6	1 <i>E. cynosura</i>	100
<i>S. williamsoni</i> (Williamson's Emerald)	8	8	0	100

*Epicordulia* (Prince Baskettail) and *Tetragoneuria* (all other species of baskettail).

In the family Libellulidae (Skimmers), only two genera had any misdeterminations at all (Table 1). Among *Leucorrhinia* and *Sympetrum*, a little over 10% of the specimens in each genus had been misidentified (Table 1). Within *Leucorrhinia*, all of the misdetermined specimens were either *L. intacta* (Dot-tailed Whiteface) or *L. proxima* (Belted Whiteface) (Table 3). The most frequently misdetermined species was *L. proxima*, with about one-third of the specimens of it having been incorrectly determined as one of the other species of *Leucorrhinia*. Regarding *L. intacta*, the most frequent error was that 10% of specimens were misdetermined as *L. hudsonica* (Hudsonian Whiteface). Although *L. hudsonica* was not misdetermined, *L. intacta* and *L. proxima* were determined as *L. hudsonica* with some frequency. We didn't record the gender of misdetermined *Leucorrhinia*, but we note from our own experiences that the subgenital plates (vulvar lamina) of females are not always clearly illustrated in keys and field guides with a frame of reference as to relative size. Further, the lateral flanges of abdominal segments 8 and 9 of preserved females often dry with the edges ventrally curved so that the subgenital plate may be partially or wholly obscured. Workers in an important insect collection would be understandably reluctant to risk damaging specimens by breaking off pieces of these flanges when spreading them apart to better see the subgenital plates (however, specimens can be relaxed in a moisturizing jar and then the flanges carefully spread apart with minimal risk). Males of these two species can also be problematic because the hamules of *L. hudsonica* and *L. intacta* differ only slightly in

shape in lateral view. These identification difficulties with *Leucorrhinia* are exacerbated with preserved specimens that are teneral, as the reproductive parts are even more apt to dry in somewhat contorted or partially obscured positions, and color patterns differ from those of mature adults.

Among species of *Sympetrum*, most of the errors involved the *internum* group (Pilgrim and von Dohlen, 2007), and especially *S. internum* (Cherry-faced Meadowhawk) (Table 4). This group of closely related species is very similar in external appearance and they seem prone to hybridize, at least in the eastern part of their ranges (Paulson, 2011; Donnelly, 2013). The most frequent error by far involved more than half of the specimens of *S. internum* being misdetermined as other species of *Sympetrum*. Of these misdeterminations,  $\frac{3}{4}$  were females that were most often confused with females of *S. obtrusum* (White-faced Meadowhawk). This result was not surprising because females of these two species have similarly shaped subgenital plates that differ in ventral view only in the extent to which the tips diverge from the midline (and with some tendency for intermediates in both species). Early key couplets to separate females of *S. obtrusum* and *S. internum* often referred to characters that were of little or no taxonomic value because they were either confusingly worded, not quantifiable, or not constant (e.g. hairiness of the thorax or face color).

The next most frequent error within *Sympetrum* was that about 12% of male *S. internum* were misidentified as male *S. rubicundulum* (Ruby Meadowhawk). This result was also predictable because males of these two species have posterior hamules that are similar in shape in lateral view, which is the view commonly depicted in most keys and field guides. In ventral or oblique ventral view, the dorsal lobes of the posterior hamules are quite different between the two species with *S. internum* having distinct inner (medial) lobes and less inclination at the tip of the lobe,

**Table 3.** Accuracy of determinations of adult *Leucorrhinia* in the University of Minnesota Insect Collection (genders combined).

Taxon	# of Specimens	# of Correct Determinations	Incorrect Determinations as the Taxon	% Correct
<i>Leucorrhinia frigida</i> (Frosted Whiteface)	22	22	0	100
<i>L. glacialis</i> (Crimson-ringed Whiteface)	4	4	0	100
<i>L. hudsonica</i> (Hudsonian Whiteface)	14	14	0	100
<i>L. intacta</i> (Dot-tailed Whiteface)	110	98	11 <i>L. hudsonica</i> , 1 <i>S. obtrusum</i>	89
<i>L. proxima</i> (Belted Whiteface)	20	13	2 <i>L. borealis</i> , 4 <i>L. hudsonica</i> , 1 <i>L. intacta</i>	65

whereas in *S. rubicundulum* the medial lobes are greatly reduced or absent, having instead shelf-like, nearly straight medial edges and with greater inclination at the tip (see illustrations in Donnelly, 2013). However, these critical characters were not used in earlier keys and have not usually been clearly illustrated in more recent keys and field guides. *Sympetrum obtrusum* and *S. rubicundulum* were less frequently misdetermined, but other species were sometimes misdetermined as one of them. *Sympetrum vicinum* (Autumn Meadowhawk) was misdetermined in 12% of cases, which we found a bit surprising because most of the misdetermined specimens were females which have a readily recognizable combination of distinguishing characteristics (a spout-shaped ovipositor and lighter-colored legs than other species of similar *Sympetrum* in the Upper Midwest). However, earlier keys often referred to legs of *S. vicinum* as being predominantly yellow, when in older adults they are distinctly brown (hence the DSA naming committee some years ago changed the common name of the species from Yellow-legged Meadowhawk to its current name).

In conclusion, this taxonomic assessment involving 102 species showed that a small percentage of the species were responsible for most of the errors in a well-curated insect collection. Five species (*L. intacta*, *L. proxima*, *S. internum*, *S. obtrusum*, and *S. vicinum*) were involved in 78% of the misdeterminations. This study identified some problematic species groups that can be vexingly similar in both field characters like body size and color, and in-hand characters like the shapes of reproductive parts. Because of these identification problems, those who teach others how to identify odonates, construct key couplets, and produce field guides for this region should be very clear and careful when describing or illustrating field and in-hand differences within these groups. Field guides especially should show clear illustrations or photographs of the hamules and subgenital plates at optimal angles for all problematic species.


Although sample sizes in genera of the corduliids were rather small, it is clear that identifications within this family can be difficult, especially with the enigmatic genus *Epitheca*. Within *Leucorrhinia*, frequent misdeterminations among *L. hudsonica*, *L. intacta*, and *L. proxima* suggest that separating these species can be tricky in large areas of the northern United States where their ranges overlap. Keys and field guides to *Leucorrhinia* should use more than one reliable character to identify them. We applaud Donnelly

**Table 4.** Accuracy of determinations of adult *Sympetrum* in the University of Minnesota Insect Collection.

Taxon	# of Specimens	# of Correct Determinations		Incorrect Determinations as the Taxon	% Correct
		Males	Females		
<i>Sympetrum corruptum</i> (Variegated Meadowhawk)	76	29	44	1♂, 2♀ <i>S. vicinum</i>	96
<i>S. costiferum</i> (Saffron-winged Meadowhawk)	78	35	42	1♂ <i>S. rubicundulum</i>	99
<i>S. danae</i> (Black Meadowhawk)	20	9	10	1♀ <i>S. vicinum</i>	95
<i>S. internum</i> (Cherry-faced Meadowhawk)	100	29	15	1♂, 3♀ <i>S. corruptum</i> , 1♂, 37♀ <i>S. obtrusum</i> , 12♂, 2♀ <i>S. rubicundulum</i>	44
<i>S. rubicundulum</i> (Ruby Meadowhawk)	32	18	13	1♂ <i>S. obtrusum</i>	97
<i>S. obtrusum</i> (White-faced Meadowhawk)	263	166	90	3♂, 4♀ <i>S. rubicundulum</i>	97
<i>S. semicinctum</i> (Band-winged Meadowhawk)	52	33	19	0	100
<i>S. vicinum</i> (Autumn Meadowhawk)	58	26	25	1♂, 1♀ <i>S. internum</i> , 5♀ <i>S. obtrusum</i>	88

(2013) for providing the first clearly illustrated ventral views of the hamules of male *Sympetrum* species in the difficult internum group. When identifying females of *S. obtrusum* and *S. internum* in the field, we suggest whenever possible that a selection of males with which they are associated be examined as well. We also note the potential for the confounding effects of hybridization between species, particularly within *Epitheca* and *Sympetrum*, which evidently occurs with some frequency in some parts of their North American ranges. However, it is beyond the scope of this note to comment further on this issue since intergrades within *Epitheca* and *Sympetrum* appear to be rare in the Upper Midwest and were not a problem in this study.

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## A Short History of Odonate Collecting in Nebraska

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Nebraska has essentially been ignored by odontologists. Most surrounding states published their “Odonates of” before 1950, but Nebraska’s best list is still an unpublished masters thesis (Keech, 1934) listing all the specimens in the University of Nebraska collection. Another indication of the paucity of attention paid to Nebraska is the Dot Maps (Donnelly, 2004a, b, c). The 1998 DSA meeting in Valentine added nine species to the state list and doubled the county records, but the Dot Maps still had only 831 county records (about eight per county). One-third of the counties had no records and two-thirds had fewer than 10.

The present paper is hardly exhaustive. We checked the following sources (the number of Nebraska specimens examined from each is in parentheses): University of Nebraska collection (UNSM; 3700); International Odontological Research Institute (IORI; 1100 not counting Sibley material [3400]); Smithsonian (USNM; 400); University of Texas as contained in OdonataCentral; Steve Hummel’s collection; small teaching collections at the University Nebraska Kearney and Chadron State College; and field notes from Jerrell Daigle, Nick Donnelly, George Harp, Steve Krotzer, Dennis Paulson, Ken Tennesen, and Hal White. The collections of John Abbott and Greg Lasley are contained in the University of Texas listings in OC; those of Duncan Cuyler, Sid Dunkle, Bill Mauffrey, and Ken Tennesen are at IORI. Oliver Flint’s specimens are in USNM. We also checked all Nebraska records in OC.

The literature on Nebraska is also limited, as expected, and we have certainly missed some. Roy Beckemeyer pointed me to a reference (Uhler, 1857) listing a *Sympetrum* from Fort Union, Nebraska and noted this was in the Dakota Territory, not Nebraska (National Historical Site near Williston, North Dakota). Consider this paper as preliminary and think about supplying additional records or literature citations to the under-informed author.

**1887–1934:** The earliest specimen in the UNSM collection is from 1887, an *Arigomphus cornutus* (Horned Clubtail) from Cuming County. There are only 55 specimens in 18 species from six counties prior to 1909. Half are from Cuming County (northeast part of state) and almost half are *Amphiagrion* (Red Damsels).

In 1910, Muttkowski published “Catalogue of the Odonates of North America” and lists *Gomphus externus* (Plains Clubtail), *Stylurus olivaceus* (Olive Clubtail) and *Sympetrum assimilatam* (= *S. rubicundulum*, Ruby Meadowhawk) from Nebraska and credits Law-

rence Bruner of Lincoln, Nebraska for list of Nebraska odonates. Bruner was the entomologist at the University of Nebraska, a world expert on grasshoppers as well as founder and first president of the Nebraska Ornithology Union, and one would presume his odonate list was longer than three. Muttkowski included Nebraska in the range of 15 additional species although not specifically mentioning the state, so Bruner’s list may well have contained all 18 species present in the UNSM collection at that time. Needham and Heywood (1929) copy Muttkowski in listing only those three species.

From 1909–1915, L.M. Gates, E.G. Anderson, L. Bruner, C.W. Dawson, E.M. Partridge, E.J. Taylor and W. Thompson collected 800 specimens in 60 species from 20 counties. Possibly Bruner organized this collecting, although Keech (1934) in the introduction to his thesis says “Much credit is due L.M. Gates who started the work on the order Odonata in Nebraska. He has made most of the collections here studied and also has identified a number of the specimens.” This all stopped after 1915 (due to World War I?) and only three specimens are present from the 1916–1920 period, plus 56 more before Keech wrote his thesis in 1934 based on about 900 specimens. Spotty collecting and a concentration on certain species and counties was general into the present century. Keech had material from only 31 counties and all the material collected in 1909 was from Antelope County, with 30 of the 35 specimens being *Ischnura verticalis* (Eastern Forktail).

In 1934, Keech submitted his masters thesis based on identifying and listing the odonate material in the UNSM collection. The thesis contains keys modified from Needham and Heywood (1929) plus a summary of specimens. If there were only a few specimens the date, sex and locality are given. If there were more specimens a summary of numbers of males and females and dates and counties where collected is given. There were 62 species in the collection at that time but through mis-identification and oversight only 57 current species were listed by Keech (26 Zygoptera; 31 Anisoptera. See the species list at the end for comments on identification and first publication dates.

All subsequent publications on Nebraska odonates have covered only a few species or been simple lists with minimal or no supporting data.

**1935–1960:** J.H. Bratt working for Montgomery in 1937 collected 61 specimens (in USNM) in the Lincoln area, including 22 *Ischnura barberi* (Desert Forktail), which

were new for the state. This species has not been found in Nebraska outside the Lincoln area (Lancaster County). From the time of Keech's thesis to 1950, only 14 specimens had been added to the UNSM collection. In 1951 and 1952, D.B. Weider with R.B. Cummings acquired 450 specimens for the B. E. Montgomery collection (now in IORI). These represented 36 species from seven counties with over 90% from the North Platte area in Lincoln County.

In 1952 and 1953, D.B. Weider added 620 specimens to the UNSM collection, covering 34 species and 18 counties, but the majority were again from North Platte area. In all three years the collecting was fairly evenly spread through the flight season except for an eight day surge in August 1951 when 350 specimens were collected.

Aside from dropping *Stylurus olivaceus* (Olive Clubtail) and failing to note *Aeshna interrupta* (Variable Darner), Needham and Westfall (1955) made no changes to the Keech (1934) Anisoptera records. This is, however, the first published listing of 29 Anisoptera species. Kormondy (1957) made a small collection in 1955 and added *Lestes congener* (Spotted Spreadwing) to state list as well as publishing five of Keech's Zygoptera species, and in 1960 Kormondy added *Aeshna canadensis* (Canada Darner) to the list.

**1961–1990:** Over 1400 specimens were added to the UNSM collection during this period. Neva Pruess, a recent Ph.D. of Donald Borror who moved to North Platte in 1963, collected over 700 of these in 1963–1964. Some of her specimens were not identified until 2006, so she missed adding *Argia nabuana* (Aztec Dancer) and *A. plana* (Springwater Dancer) to the state list. Pruess (1967) did add *Lestes australis* (Southern Spreadwing), *Argia albata* (Paiute Dancer), *A. emma* (Emma's Dancer), *A. moesta* (Powdered Dancer), *A. sedula* (Blue-ringed Dancer), *Enallagma basidens* (Double-striped Bluet), *E. exsulans* (Stream Bluet), *E. geminatum* (Skimming Bluet), *Nehalennia irene* (Sedge Sprite), *Aeshna palmata* (Paddle-tailed Darner), *Progomphus obscurus* (Common Sanddragon), and *Leucorrhinia intacta* (Dot-tailed Whiteface) to the state list. Most (21 species) of the Zygoptera listed by Keech (1934) are published here for first time, as well as the *Aeshna interrupta* overlooked by Needham and Westfall (1955).

Montgomery (1967) added *Ischnura barberi* (Desert Forktail) and *Sympetrum madidum* (Red-veined Meadowhawk) to the Nebraska list in a paper based on his collection and Pruess' list. The combined list of Pruess and Montgomery, the second complete list of Nebraska odonates, totaled 74 species (38 Zygoptera; 36 Anisoptera).

Bick and Hornuff (1972) collected 70 specimens (IORI) in Nebraska on 18–19 July 1969 and 23–24 June 1971 as they were crossing the state. These included the first and still only records for *Coenagrion resolutum* (Taiga Bluet) and *Sympetrum ambiguum* (Blue-faced Meadowhawk).

After Pruess' collecting in 1964 the UNSM collection added an average of 30 specimens a year, with little focused collecting. Many of these remained unidentified until 2006.

**1991–present:** The 1998 DSA meeting in Valentine (Cherry County) was a major advance in our knowledge of Nebraska odonates. Specimens collected in 1997–1998 in this region during activities related to the DSA meeting account for almost 300 of the 370 Nebraska specimens at USNM and 430 of the 1100 at IORI. Specimens still held in private collections or other museums could triple these numbers. Beckemeyer (1997; 1998a, b) and Beckemeyer and Hummel (1997; 1998) list over 400 county records from 26 counties representing 82 species—80% of the total state list. Nine species were added to the state list: *Argia plana* (Springwater Dancer), *Enallagma aspersum* (Azure Bluet), *E. signatum* (Orange Bluet), *Ischnura hastata* (Citrine Forktail), *Argiomphus submedianus* (Jade Clubtail), *Gomphus graslinellus* (Pronghorn Clubtail), *G. militaris* (Sulphur-tipped Clubtail), *Stylurus notatus* (Elusive Clubtail), and *Celithemis elisa* (Calico Pennant). The *Epithecica costalis* (Slender Baskettail) specimens listed as new were actually *E. cynosura* and *E. petechialis* (Common and Dot-winged Baskettail).

The third complete list comes from a Beckemeyer unpublished manuscript (ca. 1999) with 90 current species (42 Zygoptera; 48 Anisoptera). Donnelly (2000) added *Brachymesia herbida* (Tawny Pennant) and *Libellula auripennis* (Golden-winged Skimmer) to the state list by re-identifying specimens in UNSM formerly labeled *B. gravida* (Four-spotted Pennant) and *L. flavida* (Yellow-sided Skimmer). Paul Johnsgard's "Nature of Nebraska" (2001) lists 93 species, 85 of which are currently accepted as valid. Unfortunately, since this is an excellent book by a popular author with a large number of readers, several errors in the literature are perpetuated.

In 2003–2004, collectors added 350 specimens to the UNSM collection, mostly from wetland studies in Cherry and Lancaster Counties. In 2005, Fred and Peggy Sibley started systematically visiting all the Nebraska counties. What started as a 2–3 year project continued each summer through 2013, except in 2007. Adding county records proved more difficult than planned. We were not in New York anymore and raising a county list to 10 species sometimes took visits to multiple habitats and a repeat visit

the next year. Even abundant and widespread species like *Enallagma civile* (Familiar Bluet) and *Ischnura verticalis* (Eastern Forktail) were not guaranteed.

In the later years an effort was made to check museums and track down specimens for existing Dot Map records. This resulted in dropping some species and county records from the state list. Now, some 2000 new county records later, each of the 93 counties has at least 21 species, the county records for almost all species have more than doubled, and 13 species have been added to the state list during this period by Sibley and the people listed below.

Loren and Babs Padelford (Sarpy County) made sight records of several new state species before 2005. Don and Janis Paseka (Dodge County) became active odonate observers and maintain a regularly updated web site through UNSM on the odonates of Nebraska. Brian Peterson (Douglas County) has been very active since 2012 and valuable in providing regular reports from the Heron Haven Nature Center. Matt Brust (Dawes County) has similarly provided information from the northwest corner of the state.

### Species List

The tables at the end of the article contain 108 accepted species (47 Zygoptera; 61 Anisoptera) and discuss all species ever listed for Nebraska. Keech's 1934 thesis was never published, so his Anisoptera records were first published in Needham and Westfall 1955 or Pruess 1967, and his Zygoptera records were first published in Kormondy 1957 and Pruess 1967. A publication date from Keech's thesis will be preceded by (1934). "Dot Map Records" refers to Donnelly (2004a, b, c).

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**Table 1.** Damselfly (Zygoptera) species listed for Nebraska.

Species Name	Earliest Known Specimen	1 <sup>st</sup> Published Record	# Dot Map Records	Current # County records
<i>Calopteryx aequabilis</i> (River Jewelwing)	1910	(1934) 1967	7	14
<i>Calopteryx maculata</i> (Ebony Jewelwing)	1888	(1934) 1967	17	77
<i>Hetaerina americana</i> (American Rubyspot)	1910	(1934) 1967	27	87
<i>Hetaerina titia</i> <sup>1</sup> (Smoky Rubyspot)	0000	(1934) 1967	0	0
<i>Archilestes grandis</i> (Great Spreadwing)	1912	(1934) 1967	5	14
<i>Lestes australis</i> (Southern Spreadwing)	1908	(1934) 1967	1	36
<i>L. congener</i> (Spotted Spreadwing)	1951	1957	7	17
<i>L. disjunctus</i> <sup>2</sup> (Northern Spreadwing)	1969	2014	6	5
<i>L. dryas</i> (Emerald Spreadwing)	1952	(1934) 1967	3	11
<i>L. forcipatus</i> (Sweetflag Spreadwing)	1955	(1934) 1967	4	16
<i>L. rectangularis</i> (Slender Spreadwing)	1913	(1934) 1967	9	47
<i>L. unguiculatus</i> (Lyre-tipped Spreadwing)	1888	(1934) 1967	27	73
<i>Amphiagrion saucium/abbreviatum</i> <sup>3</sup> (Red Damsel)	1888	(1934) 1967	18	53
<i>A. alberta</i> (Paiute Dancer)	1964	1967	5	36
<i>A. apicalis</i> (Blue-fronted Dancer)	1912	(1934) 1967	17	80
<i>A. emma</i> (Emma's Dancer)	1952	1967	8	12
<i>A. fumipennis</i> (Variable Dancer)	1912	(1934) 1967	11	41
<i>A. moesta</i> (Powdered Dancer)	1963	1967	4	34
<i>A. nahuana</i> (Aztec Dancer)	1964	2006	0	15
<i>A. plana</i> (Springwater Dancer)	1963	1998	4	28
<i>A. sedula</i> (Blue-ringed Dancer)	1913	1967	6	20
<i>A. tibialis</i> (Blue-tipped Dancer)	1912	(1934) 1967	3	24
<i>A. vivida</i> (Vivid Dancer)	1905	(1934) 1967	6	13
<i>Coenagrion resolutum</i> (Taiga Bluet)	1971	(1934) 1967	1	1

Species Name	Earliest Known Specimen	1 <sup>st</sup> Published Record	# Dot Map Records	Current # County records
<i>Enallagma anna</i> (River Bluet)	1905	(1934) 1967	8	36
<i>E. annexum</i> (Northern Bluet)	1912	(1934) 1967	3	12
<i>E. antennatum</i> (Rainbow Bluet)	1915	(1934) 1967	7	54
<i>E. aspersum</i> (Azure Bluet)	1998	1998	1	11
<i>E. basidens</i> (Double-striped Bluet)	1963	1967	4	37
<i>E. boreale</i> (Boreal Bluet)	1913	(1934) 1967	3	7
<i>E. carunculatum</i> (Tule Bluet)	1913	(1934) 1957	7	47
<i>E. civile</i> (Familiar Bluet)	1899	(1934) 1957	27	93
<i>E. clausum</i> (Alkali Bluet)	1915	(1934) 1967	5	7
<i>E. ebrium</i> (Marsh Bluet)	1915	(1934) 1967	2	5
<i>E. exsulans</i> (Stream Bluet)	1964	1967	3	25
<i>E. geminatum</i> (Skimming Bluet)	1909	1967	2	24
<i>E. hageni</i> (Hagen's Bluet)	1902	(1934) 1967	13	37
<i>E. praevarum</i> (Arroyo Bluet)	1910	(1934) 1967	5	10
<i>E. signatum</i> (Orange Bluet)	1963	1998	2	28
<i>E. traviatum</i> (Slender Bluet)	2006	2006	0	2
<i>E. vesperum</i> (Vesper Bluet)	2008	2011	0	4
<i>Ischnura barberi</i> (Desert Forktail)	1937	1967	1	1
<i>I. cervula</i> <sup>4</sup> (Pacific Forktail)	0000	2004	1	0
<i>I. damula</i> (Plains Forktail)	1915	(1934) 1967	6	16
<i>I. hastata</i> (Citrine Forktail)	1998	1998	2	18
<i>I. perparva</i> (Western Forktail)	1905	(1934) 1967	10	10
<i>I. posita</i> (Fragile Forktail)	2004	2004	1	5
<i>I. verticalis</i> (Eastern Forktail)	1899	(1934) 1957	34	93
<i>Nehalennia irene</i> (Sedge Sprite)	1952	1967	3	7

**Footnotes to Table 1:**

<sup>1</sup> Keech (1934) lists two males and a female from Louisville, Cass County in 1913 and 1914. The specimens in UNSM corresponding to these dates and locality are *H. americana*. Pruess(1967), Westfall and May (1996), Johnson-gard (2001) and others have perpetuated this error.

<sup>2</sup> The difficulty in separating this species and *L. australis* has resulted in confusion of records (Donnelly 2000b). *Lestes disjunctus* is only confirmed by Donnelly from four northern counties.

<sup>3</sup> All *Amphiagrion* specimens from Nebraska are considered intermediate.

<sup>4</sup> The Dot Map record OC# 203611 was based on a single individual caught and sketched at Oliver Reservoir, Kimball County, on 30 August 2001. The observer was not familiar with the difference between this species and *I. damula* and used presence of a “fork” on S10 rather than the size of the fork to distinguish it. *Ischnura damula* is extremely abundant at this site and we have concluded the likelihood of someone catching a single *Ischnura* and it being an out-of-range-species very similar to the abundant resident species is zero.

**Table 2.** Dragonfly (Anisoptera) species listed for Nebraska.

Species Name	Earliest Known Specimen	1 <sup>st</sup> Published Record	# Dot Map Records	Current # County records	Species Name	Earliest Known Specimen	1 <sup>st</sup> Published Record	# Dot Map Records	Current # County records
<i>Aeshna canadensis</i> (Canada Darner)	1915	1960 (1934)	6	8	<i>Progomphus obscurus</i> (Common Sanddragon)	1960	1967 (1934)	4	24
<i>A. constricta</i> (Lance-tipped darner)	1951	1955 (1934)	6	21	<i>Stylurus amnicola</i> (Riverine Clubtail)	1909	1955 (1934)	6	13
<i>A. interrupta</i> (Variable Darner)	1911	1967	6	10	<i>S. intricatus</i> (Brimstone Clubtail)	1912	1955	8	14
<i>A. palmata</i> (Paddle-tailed Darner)	1912	1967 (1934)	3	5	<i>S. notatus</i> (Elusive Clubtail)	1998	1998	1	3
<i>A. umbrosa</i> (Shadow Darner)	1912	1955 (1934)	5	10	<i>S. olivaceus</i> <sup>3</sup> (Olive Clubtail)	0000	1910	0	0
<i>Anax junius</i> (Common Green Darner)	1912	1955	15	82	<i>S. plagiatus</i> (Russet-tipped Clubtail)	2005	2006	0	1
<i>Boyeria vinosa</i> (Fawn Darner)	1997	1997	3	3	<i>Epiheca costalis</i> <sup>4</sup> (Slender Baskettail)	0000	1998 (1934)	2	0
<i>Nasiaeschna pentacantha</i> (Cyrano Darner)	2005	2006	0	2	<i>E. cynosura</i> (Common Baskettail)	1909	1955	7	43
<i>Rhionaeschna californica</i> (California Darner)	1979	2001 (1934)	1	2	<i>E. petechialis</i> (Dot-winged Baskettail)	1998	2011 (1934)	1	14
<i>R. multicolor</i> (Blue-eyed Darner)	1913	1955	12	42	<i>E. princeps</i> (Prince Baskettail)	1913	1955	7	35
<i>R. mutata</i> <sup>1</sup> (Spatterdock Darner)	0000	“1967” (1934)	0	0	<i>E. spinigera</i> (Spiny Baskettail)	2008	2011	0	1
<i>Arigomphus cornutus</i> (Horned Clubtail)	1887	1955	2	11	<i>Neurocordulia molesta</i> (Smoky Shadowdragon)	1984	1985	1	3
<i>A. submedianus</i> (Jade Clubtail)	1997	1998	2	9	<i>Somatochlora ensigera</i> (Plains Emerald)	1997	1997	2	3
<i>Dromogomphus</i> spp. (Spinylegs)	2006	2011	0	1	<i>Brachymesia herbida</i> (Tawny Pennant)	1914	2000 (1934)	1	1
<i>Erpetogomphus designatus</i> (Eastern Ringtail)	2006	2011	0	3	<i>B. gravida</i> <sup>5</sup> (Four-spotted Pennant)	0000	1955	0	0
<i>Gomphus externus</i> (Plains Clubtail)	1888	1910	8	26	<i>Celithemis elisa</i> (Calico Pennant)	1998	1998 (1934)	1	26
<i>G. graslinellus</i> (Pronghorn Clubtail)	1915	1998 (1934)	3	6	<i>C. eponina</i> (Halloween Pennant)	1914	1955	6	63
<i>G. lividus</i> <sup>2</sup> (Ashy Clubtail)	0000	1955	0	0	<i>Dythemis fugax</i> (Checkered Setwing)	2011	2011 (1934)	0	1
<i>G. militaris</i> (Sulphur-tipped Clubtail)	1998	1998	1	18	<i>Erythemis simplicicollis</i> (Eastern Pondhawk)	1914	1955	26	92
<i>G. vastus</i> (Cobra Clubtail)	1992	2001 (1934)	2	7	<i>Leucorrhinia hudsonica</i> <sup>6</sup> (Hudsonian Whiteface)	0000	1955	0	0
<i>Ophiogomphus severus</i> (Pale Snaketail)	1905	1955	7	18	<i>L. intacta</i> (Dot-tailed Whiteface)	1913	1967	11	23

**Footnotes to Table 2:**

<sup>1</sup>Moody (1967) lists a specimen from Sheridan County; this record is considered unlikely.

<sup>2</sup>Listed by Keech (1934); perpetuated in Johnsgard (2001). Specimen identified by Donnelly (2000a) as *Gomphus graslinellus*.

<sup>3</sup>Muttkowski (1910) lists this species for Nebraska based on list from L. Bruner of the University of Nebraska. Needham and Heywood (1929) and Keech (1934) continued this error. It is likely Bruner misidentified the *Stylurus amnicola* specimen in the museum at that time and it was not included on his list to Muttkowski.

**Table 2, cont.** Dragonfly (Anisoptera) species listed for Nebraska.

Species Name	Earliest Known Specimen	1 <sup>st</sup> Published Record	# Dot Map Records	Current # County records
<i>Libellula auripennis</i> (Golden-winged Skimmer)	1960	2000	1	1
<i>L. flavida</i> <sup>7</sup> (Yellow-sided Skimmer)	0000	1967 (1934)	0	0
<i>L. forensis</i> (Eight-spotted Skimmer)	1913	1955 (1934)	1	4
<i>L. luctuosa</i> (Widow Skimmer)	1910	1955 (1934)	34	93
<i>L. pulchella</i> (Twelve-spotted Skimmer)	1912	1955 (1934)	40	93
<i>L. quadrimaculata</i> (Four-spotted Skimmer)	1914	1955 (1934)	7	10
<i>Pachydiplax longipennis</i> (Blue Dasher)	1913	1955 (1934)	29	91
<i>Pantala flavescens</i> (Wandering Glider)	1912	1955 (1934)	6	31
<i>P. hymenaea</i> (Spot-winged Glider)	1915	1955 (1934)	8	15
<i>Perithemis tenera</i> (Eastern Amberwing)	1914	1955 (1934)	16	73
<i>Plathemis lydia</i> (Common Whitetail)	1909	1955 (1934)	31	93
<i>P. subornata</i> (Desert Whitetail)	1913	1955 (1934)	2	7
<i>Sympetrum ambiguum</i> (Blue-faced Meadowhawk)	1969	1972 (1934)	1	1
<i>S. corruptum</i> (Variegated Meadowhawk)	1905	1955 (1934)	25	80
<i>S. costiferum</i> (Saffron-winged Meadowhawk)	1899	1955 (1934)	12	27
<i>S. danae</i> (Black Meadowhawk)	2012	2012	0	2
<i>S. internum</i> <sup>8</sup> (Cherry-faced Meadowhawk)	1911	1910	14	38
<i>S. madidum</i> (Red-veined Meadowhawk)	1967	1967 (1934)	1	2
<i>S. obtrusum</i> (White-faced Meadowhawk)	1908	1955 (1934)	25	67
<i>S. pallipes</i> (Striped Meadowhawk)	1912	1955 (1934)	4	9
<i>S. rubicundulum</i> (Ruby Meadowhawk)	1912	1955 (1934)	19	50
<i>S. semicinctum</i> <sup>9</sup> (Band-winged Meadowhawk)	1905	1955 (1934)	22	55
<i>S. vicinum</i> (Autumn Meadowhawk)	1905	1955 (1934)	11	22
<i>Tamea calverti</i> (Striped Saddlebags)	2010	2011 (1934)	0	2
<i>T. lacerata</i> (Black Saddlebags)	1911	1955 (1934)	12	83
<i>T. onusta</i> (Red Saddlebags)	1912	1955 (1934)	4	33

<sup>4</sup>Two records from Nebraska (Beckemeyer and Hummel, 1998) were checked by Nick Donnelly in 2012–2013. The specimen from Holt County (OC#187213) was collected three miles southeast of O'Neill by Steve and Mary Krotzer on 16 July 1998 (Krotzer collection). This specimen was determined to be *E. cynosura*. The specimen from Lincoln County (OC# 187214) was collected near North Platte by Sid Dunkle on July 15, 1998 (IORI collection). It was originally reported as *E. petechialis/costalis* but was determined to be *E. petechialis*.

<sup>5</sup>Keech (1934) lists a male specimen collected by E.G. Anderson on 2 August 1914 at Louisville, Cass County. This specimen was identified by Nick Donnelly (Donnelly, 2000a) as *Brachymesia herbida* (OC#396382). Needham & Westfall (1955) and Johnsgard (2001) perpetuate this error.

<sup>6</sup>Keech (1934) lists a female from Omaha (Douglas County) without a date but possibly 1913–1915. This specimen (in pinned reference collection of UNSM) is *Leucorrhinia intacta*. Needham and Westfall (1955) and Johnsgard (2001) perpetuate this error. The teneral female collected in Brown County (OC# 218730) on the Niobrara River south of Norden at The Nature Conservancy Preserve by R.D. Cuyler on 18 July 1998 was reported by Beckemeyer (1998) as a new state record. Nick Donnelly re-identified this in 2013 as *L. intacta* (IORI # 000057143).

<sup>7</sup>This species was listed by Pruess (1967) but was later identified by Donnelly (2000a) as *L. auripennis*.

<sup>8</sup>Keech (1934) and Needham and Westfall (1955) list this species under *S. assimilatatum*, but that is considered to be a synonym of *S. rubicundulum*.

<sup>9</sup>Frequently listed as *S. occidentalis fasciata* or *S. fasciata*, but here considered a subspecies of *S. semicinctum*.

## Fashioning Small Individual Containers for Rearing Odonata

Ken Tennessen <ktennessen@centurytel.net>

Like those who try to build a better mousetrap, I have continually tried to come up with better individual emergence containers for dragonfly and damselfly nymphs. When I was just beginning my interest in rearing nymphs, baby food jars were plentiful. I washed quite a number (while Sandi washed diapers), punched holes in the metal covers with a nail, and put a small piece of screen inside. These worked fairly well, at least for small damselflies. However, they were rather heavy and, if broken, posed a hazard. But the worst problem is that they were too small for many odonate species.


Over the years I have tried plastic cups of various sizes, including drink cups and yogurt cups. Most of these containers were rather flimsy, plus the opaque covers have to be removed in order to see inside, a time-consuming and exasperating chore. In recent years, I have found a number of sturdier, clear plastic containers that have helped me get around these problems.

The really nice ones are clear plastic peanut butter containers; they are quite sturdy and are available in several sizes. A handy size is the 16-ounce “jar”, as it can accommodate most odonates. I have to admit, washing these out takes some doing, and gathering a number of them can take time. Perhaps your friends and neighbors eat a lot of peanut butter and would be willing to save their containers for you, or maybe you belong to, or know of, an organization that feeds a lot of kids. Otherwise you can save your own jars over a long period of time. And oh yes, you’ll need a bottle brush and lots of dish detergent.

Once past these obstacles, configuring the container to hold odonate nymphs is quite easy. Drill small holes in the lid (small enough in diameter so the smallest damselfly nymphs cannot crawl through) and hot glue a wooden stick or twig to the center of the lid (Figure 1). This center piece will serve as an emergence support for the odonates. An alternative method for fastening the stick to the lid is to drill a small hole in the center and then use a screw to tighten it down. The stick or twig should be about as long

as the jar’s depth down its center. A small piece of window screen or broken pieces of aquatic plants can be put in the bottom to provide substrate and hiding places for your nymphs. Placing the jars inside a cardboard box (with partitions to prevent jars from tipping over) helps provide shade and shelter for the nymphs and is an efficient way of transporting the jars.

For the largest odonates, such as large aeshnids and cordulegastrids, I find the plastic containers in which tennis balls are sold ideal. They are certainly not as hard to wash out as the peanut butter jars, and the same technique can be used for fashioning them. I usually provide some screen, either plastic or aluminum, at the bottom and up along the side of these jars. For stream odonates, especially those that require relatively high oxygen levels, a hole can be drilled in the side of the plastic container and an air supply hose, fitted with an airstone, can be inserted.

Once a nymph has metamorphosed, the cap is unscrewed, turned upside down, and the adult can either be preserved with its exuvia or identified and released. 

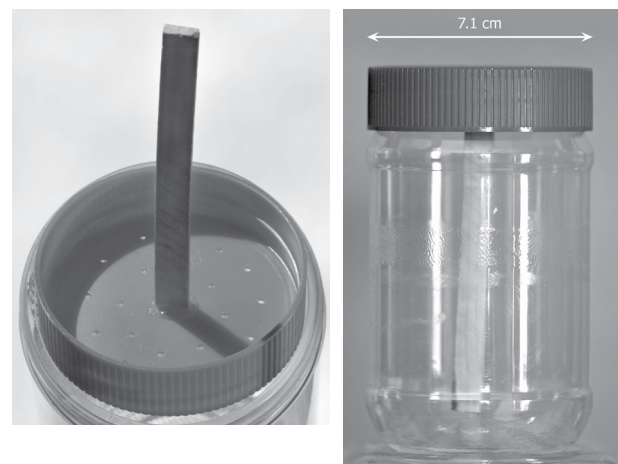


Figure 1. (L) Lid of peanut butter jar, shown upside-down, with small holes drilled in the top and a small slat glued to the center. (R) A finished emergence container made from a peanut butter jar.

### Call for Papers for BAO

Bulletin of American Odonatology needs your manuscript submissions. Help us keep BAO the vehicle for timely reporting of research on Odonata of the New World. If you have questions about BAO guidelines, please see the last page of this issue of ARGIA or contact Steve Hummel, BAO Editor, at <mshummel@iowatelecom.net>.

## Wasted Away Again in Margaritaville, a.k.a. Ten Days in Yelapa, Mexico

Kathy and Dave Biggs, 308 Bloomfield Road, Sebastopol, California 95472 <bigsnest@sonic.net>

OK, I thought that title would get your attention! You see, that is the song that Dave solos on in the Sebastopol Love Choir. And with 33 other members of the Love Choir, we spent 28 January–7 February in Yelapa, Jalisco, Mexico. Dave had many occasions to sing that Jimmy Buffett song while there. And, just in case, Kathy packed her net along, and Dave brought along two cameras...because where the Biggs go, Odes are sought.



Yelapa is quite a unique place to visit. Mileage-wise, it is only about 25 miles south of Puerto Vallarta on the west coast of Mexico, also lying within the Bay of Banderas. BUT, you can't drive there. Nor arrive by airplane. In fact, the only way to get there is by water taxi! This means there are no cars and no roads. Yelapa is in the jungle, and has not just one, but two rivers winding through it. We thought it just might be worth checking out their Odes. And they didn't disappoint us, not at all, even though it was the "off" (dry) season for dragonflies.

Dave and I rented a private casa on the outskirts of the pueblo on the Rio del Tuito, a sandy-bottomed, boulder-strewn river which we quickly discovered not only hosted Odes, but Brown Basilisk lizards, often referred to as the "Walk-on-Water" Lizards! Yes, we saw them do that! Our casa came completely furnished, with towels, bedding and even spices in the kitchen. Four large ceiling fans and many windows and double wide doors gave the place a sweet, airy feel. Right away we found a Brown Setwing (*Dythemis sterilis*) sunning in the gardens. Our casa's gardens were completely



Brown Setwing (*Dythemis sterilis*).

planted in native vegetation. A walk across the "back yard" to the river stirred up what we thought were female Threadtails (*Protoneura*), but the brush, thorns, and their diminutive size prevented us from capturing any.

Rio del Tuito through the jungle to a delightful waterfall with a deep swimming hole. While our Love Choir friends rushed to the cascade, we veered off to the vegetation along the pool side and were immediately rewarded with Fiery-eyed Dancers (*Argia oenea*). Yay! This was a species that had eluded us at the Arizona DSA meeting and in Texas at their Dragonfly Days. Also on the pool were Desert Firetails (*Telebasis salva*) and Neotropical Bluets (*Enallagma novaehispaniae*). We'd had to cross the river twice on our hike in to the falls. En route I'd netted and released several species, first showing them to the choir members. Common everywhere on the upper stretches of the river were Jade-striped Sylphs (*Macrothemis inequiunguis*), *Hetaerina occisa* Rubyspots and American Rubyspots (*H. americana*), Brown Setwings (*Dythemis sterilis*), and Cerulean Dancers (*Argia anceps*).



Upper: Fiery-eyed Dancer (*Argia oenea*). Lower: Cerulean Dancer (*A. anceps*)

Several days were spent walking in the lower reaches of the Rio del Tuito, where it forms a tidal lagoon that empties daily into the bay. These lower areas had many side pools and we found Tezpi Dancers (*Argia tezpi*), Carmine Skimmers (*Orthemis discolor*), Mexican Amberwings (*Perithemis intensa*), Spot-tailed Dashers (*Micrathyrina aequalis*) and White-tailed Sylphs (*Macrothemis pseudimitans*) there.



Another day we took a water taxi ride to nearby Boca de Tomatlan and then boarded a bus for the Vallarta Botanical Gardens. While most of the choir members oohed and aahed over the plantings, we headed to the river and the “wild jungle” there with another like-minded couple. But that was after checking out the garden pond where we did find more Desert Firetails, a lone bedraggled Great Spreadwing (*Archilestes grandis*) and some ovipositing Orange-striped Threadtails (*Protoneura cara*).

On the Rio Los Horcones below the Gardens, we found more Cerulean and Tezpi Dancers, and Racket-tipped Rubyspots. In fact, we found all three of those on one rock at the same time! We searched in vain in the jungle for Cream-tipped Swampdamsels (*Leptobasis melinogaster*), only to find upon our return to Yelapa that they'd been seen there that day by the biologists who own and run the Los Naranjos Retreat. That wasn't the only bad moment; we overloaded the last water taxi back to Yelapa, took on so much water that we had to bail, and then the engine quit on us! But all's well that ends well, and we did return, soggy and wet but with an adventure to tell our grandchildren about!

Every morning we awoke to the calls of the Orange-fronted Parakeets, West Mexican Chachalacas, and/or the Magpie Jays. We slept with all the doors open to fully experience the jungle, while still in our nice soft bed. We cut and then hung orange slices in the trees next to our patio and attracted fantastically colored butterflies and also one that looked so much like a dead leaf that I tried to pull it off! We found out it was the Itys Leafwing (*Zaretis itylus*).



A tattered Great Spreadwing (*Archilestes grandis*).



*Hetaerina occisa* Rubyspot.



*Progomphus clendonii* (Sanddragon).

Yelapa is a very safe place. The pueblo is actually a reservation, owned entirely by the inhabitants, who are almost all descendants of the four original families who settled there hundreds of years ago. They have no police, and no need for them. Members of the Puerto Vallarta police force visit twice a week, though, to settle anything necessary. We didn't see poverty and U.S. and Canadian gringos commingle with the year-round inhabitants, everyone having a good time...especially when Dave is singing “Wasted Away Again in Margaritaville”!! I felt perfectly safe walking alone at night.

On our last day there, as we walked to the water ferry, we spied a dragonfly on the bridge over the town's other river, the Yelapa River. Looking at the photo after our return, we discovered it to be a female clubskimmer. The only clubskimmer recorded in the state of Jalisco is *Brechmorhoga praecox* (Slender Clubskimmer), so that's who we assume she is, bringing the total number of species seen while we were there in Yelapa to 31 (30 of which were seen by us), and including 19 “lifers”.

The owners of Los Naranjos, a young couple named Maria and Rafael, are biologists and they would welcome any of us to stay there, including hosting a DSA Mexico meeting. We recommend their place which has open palapas and also the home we rented, Casa Irene. If anyone would like more information, feel free to contact us.

## Acknowledgements

Thanks to Dennis Paulson for his list of Mexican species by state, and to him, Enrique González Soriano, Jim Johnson, Ed Lam and other members of the Western Odonata Facebook group for their help in identifying our species from our photos.

## Species List

Our species list follows; lifers are marked with an asterisk.

- Hetaerina americana* (American Rubyspot)  
\**H. occisa* (no common name)  
*H. titia* (Smoky Rubyspot)  
*Archilestes grandis* (Great Spreadwing)  
\**Protonевра cara* (Orange-striped Threadtail)  
\**Argia anceps* (Cerulean Dancer)  
\**A. extranea* (Spine-tipped Dancer)  
\**A. oculata* (dancer; no common name)  
\**A. oenea* (Fiery-eyed Dancer)  
\**A. pulla* (Dancer –no common name)  
\**A. tezpi* (Tezpi Dancer)  
\**Enallagma novaehispaniae* (Neotropical Bluet)  
*Leptobasis melinogaster* (Cream-tipped Swampdamsel;  
not seen by the Biggs)  
*Telebasis salva* (Desert Firetail)  
\**Progomphus clendoni* (sanddragon; no common name)  
*Brachymesia furcata* (Red-tailed Pennant)  
\**Brechmorhoga praecox* (clubskimmer; no common name)  
\**Dythemis nigrescens* (Black Setwing)  
\**D. sterilis* (Brown Setwing)  
*Erythemis plebeja* (Pin-tailed Pondhawk)  
*Erythrodiplax basifusca* (Plateau Dragonlet)  
\**E. fervida* (Red-mantled Dragonlet)  
\**E. funerea* (Black-winged Dragonlet)  
*Libellula croceipennis* (Neon Skimmer)  
\**Macrothemis inacuta* (Straw-colored Sylph)  
\**M. inequiunguis* (Jade-striped Sylph)  
\**M. pseudimitans* (White-tailed Sylph)  
*Micrathyria aequalis* (Spot-tailed Dasher)  
\**Orthemis discolor* (Carmine Skimmer)  
*Perithemis intensa* (Mexican Amberwing)  
*Miathyria marcella* (Hyacinth Glider)



Upper: Carmine Skimmer (*Orthemis discolor*). Middle: Jade-striped Sylph (*Macrothemis inequiunguis*). Lower: Red-mantled Dragonlet (*Erythrodiplax fervida*).

# Splash-Dunk Analysis for 2011–2013, Including Temporal Distribution

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One of the great pleasures of summer is the opportunity to observe dragonflies, and to share the experience with others. On our field trips, my wife Betsy and I enjoy pointing out various aspects of dragonfly behavior, which is surprisingly complex and interesting.

The most spectacular dragonfly behavior we know of is the splash-dunk (for bathing) followed by the spin-dry (to shed the water.) A number of articles have presented the basic features of this behavior (Walker, 2011a; 2011b; 2012). It's great fun to share this with others on a field trip. For example, when a group of us sees a dragonfly beginning a series of splash-dunks, we call out "1, 2, 3" and so on with each successive splash-dunk. When the splash-dunks end, and the dragonfly begins to gain altitude, everyone watches expectantly, hoping to see a spin-dry. As the dragonfly spins, and water droplets shoot out in all directions, the crowd goes "ooh" and "aah" as if they're watching a fireworks show.

In this article, I present splash-dunk data collected during the summers of 2011, 2012, and 2013, mostly in Anacortes, Washington. The first set of data show the distribution of the number of splash-dunks per event, and the second show the temporal distribution of splash-dunks during the year.

## The Number of Splash-Dunks per Event

Over the last three summers, we've observed a total of 338 splash-dunk events. After each event, we record the number of splash-dunks that occurred. Most of the events have only a single splash-dunk, but many continue for a series of one splash-dunk after another. So far, the greatest

number of successive splash-dunks we've seen is eight, as described in an earlier article (Walker, 2013).

Our results are presented in Figure 1. The drop-off in the number of events corresponding to a given number of splash-dunks is rather rapid and almost exponential, except for the case of three splash-dunks. It was apparent in the field this year that there was a marked tendency toward three splash-dunks, and this is reflected in Figure 1 as a bit of a "shoulder" in the data at that value. It will take additional observations to reveal if this is a significant feature of splash-dunk behavior or a fluctuation.

The average number of splash-dunks per event is  $2.31 \pm 0.19$ , essentially the same as at the end of the 2012 season. The time between splash-dunks is typically a couple of seconds, so events with seven or eight splash-dunks take quite some time to unfold. Even a typical event with two or three splash-dunks lasts long enough that one can readily point them out to observers on a field trip. I can attest that it is well worth the effort; typical reactions show a great deal of pleasure and excitement at seeing this fleeting behavior.

## Temporal Distribution of Splash-Dunks

Splash-dunk events in Anacortes, Washington have been observed in every month from May to November. The distribution of events is not uniform over this period of time, however (Figure 2). Clearly, there is a significant peak in splash-dunk activity in September. In fact, more events are seen in that month than in all other months combined.

I found the results in Figure 2 to be quite interesting, and

Combined splash-dunk results for 2011, 2012 and 2013

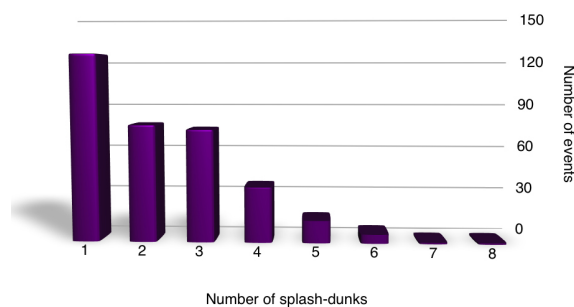


Figure 1. Number of splash-dunk events vs. number of splash-dunks per event for 2011–2013. Results reflect observation of 338 events.

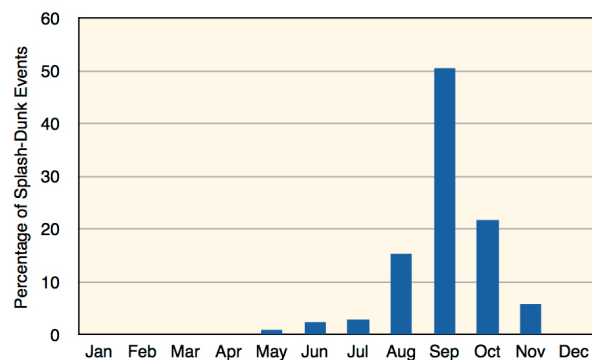


Figure 2. Distribution of splash-dunk events over time in Anacortes, Washington.

a bit surprising as well. I knew that splash-dunk activity was high in late summer and early fall, but I hadn't expected there would be such a sharp peak for one particular month. Of course, the splash-dunk distribution may be quite different in other parts of the country, but this is what is observed in the Pacific Northwest.

In a sense, the peak in September is not unexpected. Why is that? Well, the vast majority of splash-dunks in Anacortes are performed by Paddle-tailed Darners (*Aeshna palmata*), though other species sometimes splash-dunk as well (Walker, 2011a; 2011b). It's interesting, then, to compare the temporal distribution of splash-dunks with the flight season of the Paddle-tailed Darner (Figure 3). This plot gives the percentage of all sightings of Paddle-tailed Darners that have occurred in a given month. For example, roughly 40% of our observations of this species occur in September. Comparing with Figure 2, we see a striking similarity between the flight season of Paddle-tailed Darners and the splash-dunk distribution.

Other dragonflies are also involved in splash-dunk-

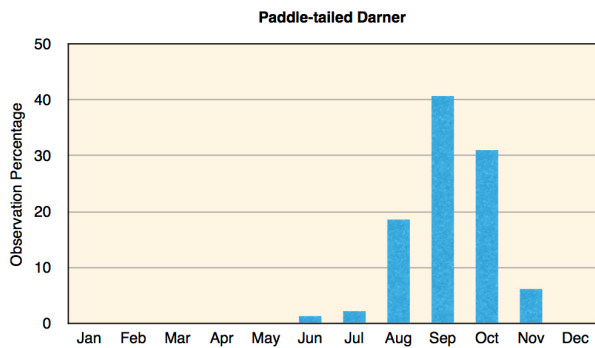


Figure 3. Observation percentage vs. time for Paddle-tailed Darner (*Aeshna palmata*) in Anacortes, Washington.

ing at our location, and most of them are darners. For example, California Darners (*Rhionaeschna californica*) and Blue-eyed Darners (*R. multicolor*) provide many of the early-season splash-dunks. Some of the late-season splash-dunks are performed by Shadow Darners (*Aeshna umbrosa*). Still, we find that most splash-dunks that can be associated with a specific dragonfly are done by male Paddle-tailed Darners.


## Conclusions

Splash-dunking and spin-drying are fascinating aspects of dragonfly behavior that can be shared with others on a field trip. Most splash-dunk events consist of a single splash-dunk, but a significant percentage have 2–4 or more splash-dunks. In the Pacific Northwest, the best month to observe this behavior is September, and the best dragonflies to watch are darners.

## Acknowledgements

I would like to thank Betsy Walker for help collecting the data presented here, and for co-leading our dragonfly field trips.

## Literature Cited

- Walker, J.S. 2011a. Spin-dry dragonflies. *ARGIA* 23(3): 29–31.
- Walker, J.S. 2011b. Splash-dunk analysis, 2011. *ARGIA* 23(4): 29–30.
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- Walker, J.S. 2013. The strange case of the constipated darner. *ARGIA* 25(3): 29–30. 

## Back Issues of Odonatologica Are Available from IORI

Back issues of Odonatologica are available at a drastic reduction in price in order to free up needed shelf space. Discounted rates include: 80% for many full-year sets; 70% for individual issues (1986 and later); and 50% for earlier issues (1972–1985). Discounts for orders placed by 15 March 2014.

Send an e-mail request for more information or for a list of available issues to Bill Mauffray at <iodonata@gmail.com>.

## Photos Needed for ARGIA

Contact the Editor <celeste@xerces.org> if you'd like to make a contribution for an ARGIA front or back cover. Submitted photos may be saved for later issues. We need high-quality images with a resolution of 300 ppi at about the sizes you see printed in this issue (6.5 inches in width). Please check that your images will have high enough resolution for printing before sending them. Images in TIFF format are best, but JPEGs work too if they are high quality and compression artifacts are limited. Please send photos as attachments (up to 15 MB) or via a file transfer service as opposed to being embedded in the body of an e-mail.

# *Epiaeschna heros* (Swamp Darner) and Survivorship During Dry Periods in Vernal Pools

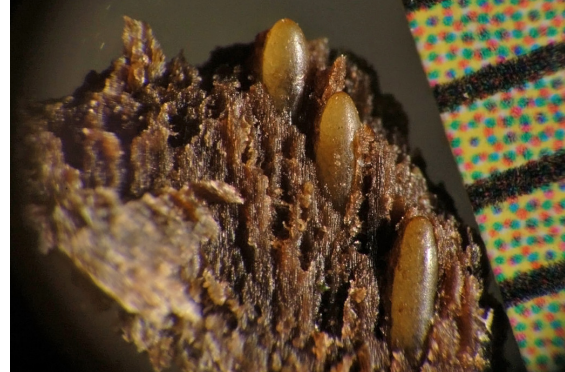
Andrew E. Boose <boose@metroparks.net>

In Ohio, *Epiaeschna heros* (Swamp Darner) occurs from late April to late August (Glotzhofer and McShaffrey, 2002). Early season records may be migrants from the south, with a resident population emerging later in the season. One commonly used habitat for ovipositing (egg laying) by *E. heros* is vernal pools. Is this a habitat that is able to sustain annual population of *E. heros*, given the propensity for vernal pools to go completely dry three to six months of the year? Much of the literature I have read questions whether *E. heros* is waiting out these dry periods as eggs and hatching when the pools fill in the spring. As far as I could find there was no study on how, if in fact at all, *E. heros* survives dry spells.

Many habitats occupied by dragonfly larvae become devoid of free water, intermittently or regularly, for several consecutive weeks or months in the course of a year. (Corbet, 1999) Corbet's studies are based in tropical and desert habitats, however, and there are no references to the midwestern U.S. Vernal pools are an example of habitats where water is normally seasonally temporary. The pools fill in the late winter and early spring and go dry as early as May, depending on precipitation, soil composition, water depth, temperature, and how much shade the pool receives.

Adult female *E. heros* are 90 mm long and can be easily seen ovipositing into soft waterlogged wood and mud at a vernal pool's edge to over two meters above water level in old stumps. Oviposition occurs in central Ohio around the end of April (Glotzhofer and McShaffrey, 2002). Eggs are deposited parallel to one another approximately 3 mm below the surface in series of one or more. On 29 May 2010, a female was observed ovipositing into mostly submerged waterlogged limbs and logs at a vernal pool near Boyer Pond in Westerville, Ohio. A piece of a limb 70 mm in diameter and 280 mm long was collected to photograph the eggs. Two eggs were excavated from the wood and placed in a small jar of water collected from the swamp, where they hatched in 18 days.

Pieces of wood that contained eggs were placed in an aquarium filled with water from the swamp. The wood was submerged to the same level as it was prior to being collected from the swamp. Eight eggs from the wood samples hatched in 31 days. The larvae that hatched from the eggs excavated from the wood then went on to spend the next year developing in an aquarium until emerging as



Swamp Darner eggs (*Epiaeschna heros*) laid in wood.

adults on 30 May 2011. None of the eggs that hatched in June 2010 developed to a stage that allowed emergence before the end of summer 2011 despite being fed copious amounts of fairy shrimp, mosquito larvae, midges, and small earthworms. Some literature suggests that *E. heros* survived seasonal dry periods as eggs. I found that eggs left in wood that were allowed to dry for as few as 10 days failed to emerge after the wood was re-wetted. The eggs that were excavated from the dried wood samples showed no signs of development. This suggests that *E. heros* needs more than one season to completely develop into an adult and that eggs can not survive after a short period of drying, let alone for an entire season.

To further investigate the question of whether *E. heros* are surviving in vernal pools that have a seasonal absence of water, I selected a 1080 square meter vernal pool in Sharon Woods, Metro Park in Westerville, Ohio as a study site. The pool is surrounded by several large 100+ year old bur oaks and many smaller elms, maples and ash (note that as of this writing in 2014, all of the ash is now dead due to the effects of Emerald Ash Borer). On 29 July 2010, 35 *E. heros* larvae sized 25 mm and smaller were netted from the pond, which was about  $\frac{3}{4}$  full. This determined that a pre-existing population was present for study. Total sampling time was two people working for 20 minutes each. Positive identification was made using keys in Westfall *et al.* (2000).

By 17 September 2010 the pool was completely devoid of water. Under the once-submerged leaf litter, the soil was hard and cracked. I surmised there would be a gathering of dead larvae at the deepest point in the pool where the last of the water would have pooled. There were none to be found, but individuals were found in the shade of the

large trunk and limbs of a dead oak that had fallen into the vernal pool. After 10 minutes of searching we found six individuals in the leaf litter, approximately 12–30 mm below the surface of the leaf litter. The larvae were not burrowed into the mud, but rather resting between layers of leaves. They were placed in water and after a few minutes returned to normal movement; feeding resumed within 24 hours. The six larvae were placed in an aquarium for observation, to be returned to the pool when it filled with water.

On 2 January 2011, five larvae were excavated from the frozen leaf litter. The pool still had no free water. Each larva was placed in an individual plastic monitoring tub 11 cm wide by 15 cm long by 6 cm deep, with plastic sides and window screen attached to the top and bottom to keep the larva in the tub and allow water and air to move freely. As larvae were found, each was placed in its own separate tub along with leaf litter in a manner as close as possible to how they were found in the leaf litter in the dry vernal pool. Each tub was then placed back into the leaf litter to mimic their original resting place and anchored on four sides with small metal stakes to prevent it from floating when the pool refilled. A one meter piece of fishing line was then tied to the top of the tub and a float tied to the other end for easier relocation after the pool had filled with water. The fishing line was left coiled on top.

On 27 February 2011 the pool had 27 cm of water after having been dried, subjected to below-freezing temperatures, covered in snow, and then finally filling. After donning waders, I located each tub by finding the floats and pulling the tubs out with the attached fishing line. All five larvae were still living and had moved to the top of the leaf litter in the tubs. The larvae were then placed in an aquarium to be fed and monitored in individual cells. While in the aquarium they were fed fairy shrimp, midges, small earthworms, and a copious amount of water fleas. In June 2011 one of the five larvae emerged as an adult male. The other four larvae were returned to the pool to finish their development.



Dried vernal pool site.



Swamp Darner (*E. heros*) larva in leaf litter in dried vernal pool.



Teneral Swamp Darner (*E. heros*) with exuvia.

In conclusion, I have found that *E. heros* does not survive in the egg stage during dry spells but it can survive in the larval stage for long periods (in this case, five months and ten days) in vernal pools after the pool is devoid of water. I also found that *E. heros* maintains a viable local population using vernal pools. In a 2006 issue of *Williamsonia*, the publication of the Michigan Odonata Survey, Mark O'Brien asked whether Michigan had local populations of *E. heros*. Perhaps the process I describe here could be used in Michigan as well to help answer that question.

### Acknowledgements

A special thanks to Mac Albin, Metro Parks Aquatic Ecologist, for inspiring an inquiry into the Swamp Darner's life history and joining in the sampling for larvae.

## References

Corbet, P.S. Dragonflies: behavior and ecology of Odonata. Comstock Publishing Associates, Ithaca, New York. Pp. 189.

## Odonata in the News

Odonata in the News is compiled by the Editor. Please feel free to send any alerts about noteworthy items, news stories, and popular articles, or scientific publications to <celeste@xerces.org>.

A sampling of the most recent newsworthy odonata includes:


Corser, J.D., E.L. White, and M.D. Schlesinger. 2014. Odonata origins, biogeography, and diversification in an Eastern North American hotspot: multiple pathways to high temperate forest insect diversity. *Insect Conservation and Diversity*, doi: 10.1111/icad.12065. The authors assessed the origins and historical biogeography of odonates in New York state and looked at regional drivers of diversity. Available at <<http://tinyurl.com/lrz3xrs>>.

Dijkstra, K. D. B., G. Bechly, S. M. Bybee, R. A. Dow, H. J. Dumont, G. Fleck, R. W. Garrison, M. Hamalainen, V. J. Kalkman, H. Karube, M. L. May, A. G. Orr, D. R. Paulson, A. C. Rehn, G. Theischinger, J. W. H. Trueman, J. Van Tol, N. Von Ellenrieder, and J. Ware. 2013. The classification and diversity of dragonflies and damselflies (Odonata). *Zootaxa* 3703: 36–45. An updated classification and number of described genera and species up to family level. Available at <<http://tinyurl.com/lypnu9f>>.

Kutcher, T.E. and J.T. Bried. 2014. Adult Odonata conservation as an indicator of freshwater wetland condition. *Ecological Indicators* 38: 31–39. This study explored the feasibility of using odonates as wetland bioassessment tools by assigning coefficients of conservatism (CoC; relative vulnerability to habitat degradation) to different species and using the mean CoC of all species found in a particular habitat as an Odonata Index of Wetland Integrity (OIWI). Available at <<http://tinyurl.com/lrlcns>>.

Patten, M.A. and B.D. Smith-Patten. 2014. Odonata species of special concern for Oklahoma, USA. *International Journal of Odonatology* 16(4): 327–350. Using their own extensive surveys plus thousands of museum specimens dating as far back as 1877, they assessed the status and distribution of all 161 species recorded in the state and categorized nine species as critically imperiled,


Glotzhober, R.C. and D. McShaffrey, eds. 2002. The dragonflies and damselflies of Ohio. *Ohio Biological Survey Bulletin, New Series* 14(2): 169.

Needham, J.G., M.J. Westfall Jr., and M.L. May. 2000. *Dragonflies of North America*. Scientific Publishers, Gainesville, Florida. 939 pp. 

13 as imperiled, and 18 as vulnerable. Most of these species prefer lotic (flowing) waters. In contrast, the state conservation plan lists only three odonate species of special concern (SoC). Available at <<http://tinyurl.com/mpujab7>>.

Sánchez-Guillén, R.A., J. Muñoz, G. Rodríguez-Tapia, T.P. Ferial Arroyo, and A. Córdoba-Aguilar. 2013. Climate-induced range shifts and possible hybridisation consequences in insects. *PLoS ONE* 8(11). An examination of the potential response of seven species of Mediterranean *Ischnura* to the effects of global climate change, including changes in distribution and possibility of hybridization. They predict a general displacement of these species to the north and west, a decrease in distribution ranges for six of the seven species examined, increased range overlap, and increased potential for mating and hybridization between sister species. Available at <<http://tinyurl.com/kw3sb3r>>.

Suhonen, J., E. Korkeamäki, J. Salmela, and M. Kuitunen. 2014. Risk of local extinction of Odonata freshwater habitat generalists and specialists. *Conservation Biology* DOI: 10.1111/cobi.12231. A study of local extinctions among the 31 most abundant species of dragonflies and damselflies in Finland from 1930–1975 and 1995–2003 found that 30% of the local populations were extirpated during the study periods. Somewhat unexpectedly, specialist species had lower extinction rates than generalist species. This was attributed to the fact that the specialists tended to occur in high-quality habitats, while generalists occurred in both low- and high-quality sites.

Weiderman S.D. and D.C. Carroll. 2013. Selective attention in an insect visual neuron. *Current Biology* 23(2): 156–161. Odonates can capture individual prey within a swarm, so they must be able to select one moving target from among many. In lab studies the dragonfly visual neuron CSTMD1 involved in motor detection consistently “chose” only one of two targets when both moved simultaneously across visual field, providing new insights on selective attention in odonates. 

## How I Fell Into the Clutches of the Odonata

This feature provides brief essays from DSA members that describe how, when, where, and why they first became interested in Odonata, and is also a way for members to find out more about one another. If you would like to contribute, write a short essay describing your first forays into the world of Odonata and how it has affected your life since, including your most interesting ode-hunting tale, and send it to the Editor at <celeste@xerces.org>. Whether you just discovered odonates this summer or have pursued them for decades, I know there are interesting, entertaining, and inspiring stories to tell. In this installment, Paul Dacko finds his love of nature photography and birding taking him to the water.

### The Right Place at the Right Time

Paul Dacko <pdacko1@ameritech.net>


My hobby is nature photography. It was my wife's fault, as she put bird feeders and bird houses in our back yard several years ago and we argued as to what species were coming around. I then tried to get a picture of the birds for identification. My first attempts were terrible, and as a technical person, this became a worthy challenge. It took some time but I finally got it right. In the process I spent a lot of time at some of the local forest preserves and park areas. My equipment attracted a bit of attention from the forest preserve staff and they were very helpful with identification of the specimens I photographed and encouraged me to take pictures to document the birds, animals, plants and insects I came across. I donated all of my pictures for them to use in their programs.

Many of the spots where I was taking pictures had small ponds and lakes. One day, I saw a post on the Illinois Bird Forum which was suggested that some of the birders might want to join the Illinois Odonate Survey. I thought this was a good idea, since I was in many likely good habitats and could maybe network a bit to see what others were finding in the area. This would also give me knowledgeable contacts to help with identification.

At that time, Craig Stettner was running the Illinois dragonfly monitoring network and accepted my offer, as no one had been doing much in the way of surveys in the southern suburban area of Chicago for the last 20 years or so. I did my surveys differently than most because I documented my results with pictures. If I was uncertain about identification, I would submit pictures to Craig and he would respond as to the species and the important characteristics of the particular dragonfly or damselfly in question. I had submitted some damselflies and dragonfly pictures to Craig that I had taken in the Las Vegas area when

I was on vacation and he put me in touch with Marla Garrison, who attempted to help me. Now I had two contacts to help me identifications! Then it happened...

I was at a local forest preserve called Cherry Hill Woods (Cook County) looking for yellow-breasted chats, which had been known to nest in this area, when a movement caught my eye. As any nature photographer will do, I quickly got a few shots of a black dragonfly. I moved in closer and got a few more photos before it took off. I then looked at what I got, hoping I would have something acceptable, and to my surprise found I was looking at a perfect Arrowhead Spiketail (*Cordulegaster obliqua*). I waited about 35 minutes and had three more sightings but no more landings to photograph. As I returned to the parking lot I cautiously approached a spot along the trail that I thought would be a likely place for dragonflies to roost, and sure enough, here was another one. I took pictures for almost thirty minutes before it took off.

When I got home I forwarded a few of the pictures to Craig Stettner but received an auto-reply that he was out on vacation. I then e-mailed Marla Garrison, who got back to me and confirmed my identification as an Arrowhead Spiketail. She also informed me that this record at that time represented only the second known site for this species in the state of Illinois. Now I was hooked—can you imagine what the odds are for someone with some limited knowledge of dragonflies being in the right place with the right equipment and with the right light to get a good photograph of a rare species? And that is how I really fell into the clutches of the Odonata. 



Arrowhead Spiketail (*Cordulegaster obliqua*), Cherry Hill Forest Preserve, Chicago, Illinois.




## Parting Shots

Parting Shots pays tribute to the endless diversity and interest of odonate behaviors and the quick-moving and skilled photographers among us, with an additional nod to the many unexpected (and sometimes downright silly) ways in which odonates can creep into daily life. If you have photos that showcase some odd, bizarre, unusual, unexpected, or amusing aspect of odonate life (or of life with odonates), please send them to the Editor at <celeste@xerces.org>, along with a short note describing the photo and event.

### The Circle of Life

Jim Burns <jpbaztec@aol.com> showcases some of the more gruesome ways in which life in the odonate world can come to an abrupt end:

“The Great Basin Snaketail/Tule Bluet (*Ophiogomphus morrisoni*/*Enallagma carunculatum*) shot was taken in Oregon last summer, and was one of those grossly fascinating encounters where the bluet’s abdomen, the lower end, slowly, gradually gets shorter and shorter as the snaketail works on the upper end where you know what’s happening even though you can’t (thankfully) see the actual mechanics of the bluet’s ingestion. I’ve seen this dragon-on-damsel predation a few times now, and it always reminds me of long strands of spaghetti slowly disappearing up into the mouth of a small boy eating Italian the easiest and most fun way he can.

The robber fly/Springwater Dancer (*Argia plana*) scenario, taken in southeast Arizona just north of the border, is interesting because the dancer has already lost color in its thorax and abdomen, its fate already sealed even though the expressive eyes seem to be holding out for some hope as the fly literally sucks the life out of it.” 



Great Basin Snaketail male (*Ophiogomphus morrisoni*) eating a Tule Bluet (*Enallagma carunculatum*), Deschutes County, Oregon, 2013.



Springwater Dancer (*Argia plana*) being consumed by a robber fly, Cochise County, Arizona, July 2013.

## Request for Gray Petaltail (*Tachopteryx thoreyi*) Specimens

I am collecting Gray Petaltail specimens for a population study that John Abbott, Jessica Ware, and I are performing. We have questions about the relationships between populations of this species, and are asking for fresh specimens from anywhere within its range for morphology and DNA work. We would like to have as thorough coverage as possible of the entire range of the species.

We would like to have 1–2 specimens (adults or nymphs) mailed to my attention at the address below. If you are able to help, e-mail me at <cbeatty@scu.edu> and I can provide you with sample containers with preservative, a shipping container, and an account number to cover shipping costs. Thanks in advance for your help!

Christopher Beatty, Santa Clara University, 500 El Camino Real, Santa Clara, California 94061

## **ARGIA and BAO Submission Guidelines**

Digital submissions of all materials (via e-mail or CD) are vastly preferred to hardcopy. If digital submissions are not possible, contact the Editor before sending anything. Material for ARGIA should be sent to Celeste Mazzacano, The Xerces Society for Invertebrate Conservation, 628 NE Broadway, Suite 200, Portland, Oregon, USA 97232, <celeste@xerces.org>. Material for BAO must be sent to Steve Hummel, Lake View, Iowa, USA 51450, <mshummel@iowatelecom.net>.

### **Articles**

All articles and notes are preferably submitted in Word or Rich Text Format, without any figures or tables, or their captions, embedded. Please submit all photos and figures as separate files (see Figures below). Only minimal formatting to facilitate review is needed—single column with paragraph returns and bold/italic type where necessary. Include captions for all figures and tables in a separate document.

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.

### **Figures**

Submit figures individually as separate files, named so that each can be easily identified and matched with its caption. Requirements vary depending on the type of graphic.

Photographs and other complex (continuous tone) raster graphics should be submitted as TIFF (preferred) or JPEG files with a minimum of 300 ppi at the intended print size. If unsure about the final print size, keep in mind that over-sized graphics can be scaled down without loss of quality, but they cannot be scaled up without loss of quality. The printable area of a page of ARGIA or BAO is 6.5 × 9.0 inches, so no graphics will exceed these dimensions. Do not add any graphic features such as text, arrows, circles, etc. to photographs. If these are necessary, include a note to the Editor with the figure's caption, describing what is needed. The editorial staff will crop, scale, sample, and enhance photographs as deemed necessary and will add graphics requested by the author.

Charts, graphs, diagrams, and other vector graphics (e.g. computer-drawn maps) are best submitted in Illustrator format or EPS. If this is not possible, then submit as raster graphics (PNG or TIFF) with a minimum of 600 ppi at the intended print size. You may be asked to provide the raw data for charts and graphs if submitted graphics are deemed to be unsatisfactory. When charts and graphs are generated in Excel, please submit the Excel document with each chart or graph on a separate sheet and each sheet named appropriately (e.g. "Fig. 1", "Fig. 2", etc.)

### **Tables**

Tables may be submitted as Word documents or Excel spreadsheets. If Excel is used, place each table on a separate sheet and name each sheet appropriately (e.g. "Table 1", "Table 2", etc.)

# The Dragonfly Society Of The Americas

Business address: Celeste Mazzacano, The Xerces Society for Invertebrate Conservation, 628 NE Broadway, Suite 200, Portland, Oregon, USA 97232

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**ARGIA**, the quarterly news journal of the DSA, is devoted to non-technical papers and news items relating to nearly every aspect of the study of Odonata and the people who are interested in them. The editor especially welcomes reports of studies in progress, news of forthcoming meetings, commentaries on species, habitat conservation, noteworthy occurrences, personal news items, accounts of meetings and collecting trips, and reviews of technical and non-technical publications. Membership in DSA includes a digital subscription to ARGIA.

**Bulletin Of American Odonatology** is devoted to studies of Odonata of the New World. This journal considers a wide range of topics for publication, including faunal synopses, behavioral studies, ecological studies, etc. The BAO publishes taxonomic studies but will not consider the publication of new names at any taxonomic level.

## Membership in the Dragonfly Society of the Americas

Membership in the DSA is open to any person in any country and includes a digital subscription to ARGIA. Dues for individuals in the US, Canada, or Latin America are \$15 us for regular memberships (including non-North Americans), institutions, or contributing memberships, payable annually on or before 1 March of membership year. The Bulletin Of American Odonatology is available by a separate subscription at \$20 us for North Americans and \$25 us for non-North Americans and institutions. Membership dues and BAO subscription fees should be mailed to Jerrell Daigle, 2067 Little River Lane, Tallahassee, Florida, USA 32311. More information on joining DSA and subscribing to BAO may be found at <[www.dragonflysocietyamericas.org/join](http://www.dragonflysocietyamericas.org/join)>.

**Back cover:** (upper) *Gomphomacromia* (prob. *paradixa* Baruer) nymph, Los Lagos, Chile, 13 December 2013. Photo by Greg Courtney. (lower) *Sympetrum obtrusum* (White-faced Meadowhawk) in copula, Ferdinand, Essex County, Vermont, 24 August 2013. Photo by Bryan Pfeiffer.

