

# Update to the Odonata Species Richness Project

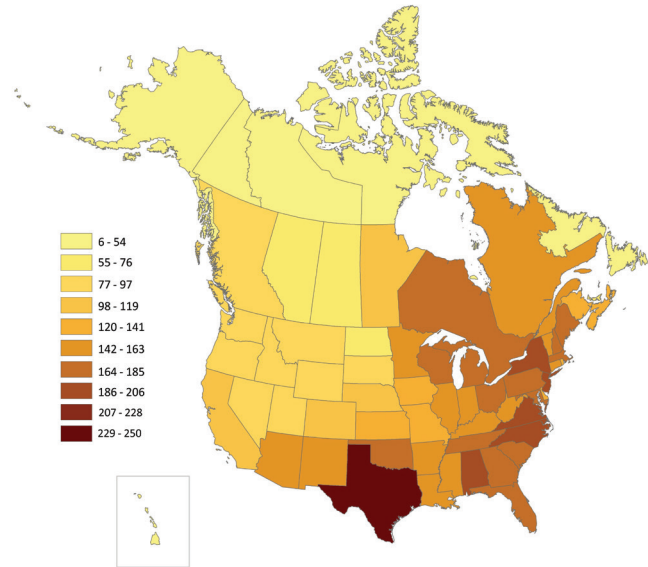
By Brenda D. Smith

This is the third installment of the species richness annual article series that began in 2019 (Smith-Patten 2019; Smith 2020). Recall that the principal goal of this series is to compile lists of odonate species and to do so in a standardized way (with much scrutiny and documentation) so that, among other endeavors, species diversity (or richness) can be examined across national and sub-national jurisdictions.

For this installment, I thought a visual approach might be beneficial, so I prepared some maps. Plotting species list totals for states, provinces, and territories in Canada and the United States shows both a latitudinal and longitudinal gradient, with southern and eastern regions having higher species-richness (Fig. 1). Not surprisingly then, the top ten Odonata species lists in the United States and in Canada (Table 1) all fall within this region. Also, note that Ontario has moved up the list to join Oklahoma in the tenth ranking.

One of the goals of the Species Richness Project is to provide data so that the checklist generator in Odonata Central (OC) can produce lists that correspond to official jurisdictional lists (i.e., lists of species with known and documented occurrences in that jurisdiction). The only way to do this is to encourage record submissions that document species occurrences so that those species will appear on OC's checklists. I am happy to report that efforts to meet this project goal have done just that (Table 1).

When I first started comparing official and OC species lists in early 2019, only about half of OC lists for the United States corresponded to official lists. Now, almost three quarters of the lists agree. Glaring discrepancies for the United States remain in the number of species for which documentation is lacking on OC, including for the United States as a whole (nine species) as well as for Hawaii (ten species) and Washington DC (65 species). It should be noted that the overall official United States list includes species recorded within the contiguous states, Washington DC, Alaska, and Hawaii. The OC list for the United States includes these areas as well as Puerto Rico – presumably because it is a commonwealth of the United States. However, given its self-governing status and location within the Caribbean, I argue that it ought to be treated as its own political entity, just as OC treats the United States Virgin Islands. Hawaii is of special consideration because, although it is completely under the political jurisdiction of the United States, the huge distance that lies between the islands and the United States mainland renders it biogeographically distinct. As such, it could be argued that the 29 species that occur in Hawaii, but not elsewhere in the United States, ought to be



**Figure 1.** Odonate species richness across Canada and the United States. There are latitudinal and longitudinal gradients, with richness being highest in eastern and southern regions.

treated separately. Nonetheless, out of tradition, I included these species in the total United States list (497 species) and I encourage anyone with documentation of those species (and those missing from DC) to please submit them to help reconcile the OC checklists.

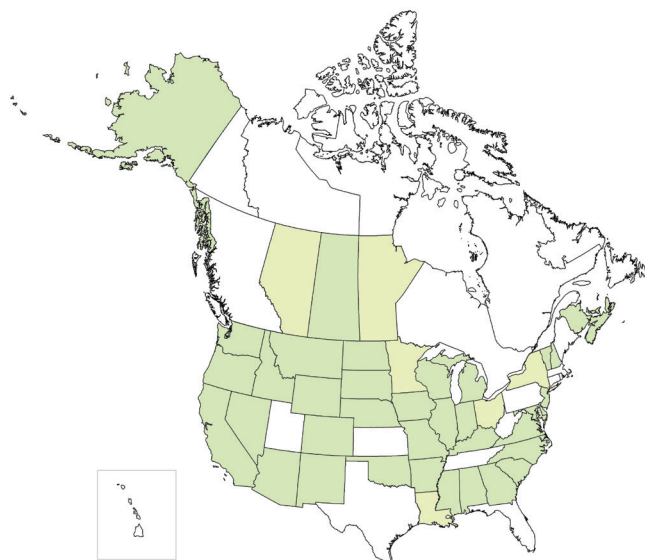
For Canada, the number of jurisdictional lists that match OC has stayed about the same since the project began (around 30 percent), but the differentials have declined greatly. For example, in 2019 the Northwest Territories, Yukon Territory, and Nunavut all had zero species on OC; those now have 36, 34, and 2, respectively — values which are much closer to their known totals of 43, 41, and 6. Likewise, there was a difference of eight species for Manitoba, whereas now there is but one. Such a minor discrepancy is true, too, for the country list, which stands at 217 (or possibly 218) species.

The successes of the project thus far are all thanks to the hard work of the jurisdictional editors/coordinators and various contributors of late. Many thanks to: Rich Bailowitz, Giff Beaton, Kathy Biggs, Mike Blust, Jason Bried, Rob Cannings, Rick Cheicante, Julie Craves, Larry de March, Marion Dobbs, Denis Doucet, Bob Dubois, David Halstead, Mike Hannisian, Chris Hill, Steve Hummel, Pam Hunt, Jim Johnson, Colin Jones, John Klymko, Nathan Kohler, Steve Krotzer, Brett Landwer, Greg Lasley, Harry LeGrand, Bill Mauffray, Devin Moon, Mike Moore, Darrin O'Brien, Richard Orr, Dennis Paulson, Janis Paseka, Michael A.

## Articles

**Table 1.** Total number of species recorded in jurisdictions within Canada and the United States. Comparison of Odonata Central (OC) jurisdictional checklists with the official lists, i.e., species with known occurrences within that jurisdiction (diff = differential). Top ten species totals are ranked.

Jurisdiction	Official	OC	diff	rank	Jurisdiction	Official	OC	diff	rank
Texas	250	250	0	1	New Mexico	143	143	0	
Virginia	198	196	-2	2	Rhode Island	137	137	0	
New York	195	195	0	3	New Brunswick	134	134	0	
North Carolina	189	188	-1	4	Kansas	131	131	0	
New Jersey	188	188	0	5	Delaware	124	124	0	
Alabama	186	182	-4	6	Iowa	124	124	0	
Pennsylvania	184	184	0	7	Nova Scotia	124	121	-3	
Maryland	183	180	-3	8	Colorado	118	118	0	
Georgia	178	177	-1	9	California	115	115	0	
Oklahoma	176	176	0	10	Nebraska	114	113	-1	
Ontario	176	174	-2	10	Manitoba	107	106	-1	
Florida	172	172	0		Utah	97	97	0	
Wisconsin	171	163	-8		Nevada	97	97	0	
Michigan	169	169	0		South Dakota	94	95	1	
Massachusetts	168	168	0		Montana	93	94	1	
Ohio	168	168	0		Oregon	93	93	0	
Tennessee	167	167	0		Washington DC	93	28	-65	
New Hampshire	166	160	-6		British Columbia	87	87	0	
South Carolina	164	164	0		Washington	82	82	0	
Maine	163	161	-2		Wyoming	81	81	0	
Kentucky	156	155	-1		Idaho	81	81	0	
Indiana	151	151	0		Saskatchewan	76	76	0	
Connecticut	150	150	0		Prince Edward Island	73	64	-9	
Minnesota	149	152	3		Alberta	72	70	-2	
Illinois	149	148	-1		North Dakota	68	68	0	
Arkansas	148	147	-1		Northwest Territories	43	36	-7	
Vermont	146	146	0		Newfoundland and Labrador	41	41	0	
Quebec	146	141	-5		Yukon Territory	41	34	-7	
Mississippi	145	145	0		Alaska	35	35	0	
Arizona	144	144	0		Hawaii	32	22	-10	
Louisiana	144	144	0		Nunavut	6	2	-4	
West Virginia	144	144	0						



**Figure 2.** Coverage for the Odonata Species Richness Project. Jurisdictions are color coded, with those having official list keepers (darker green), those with data contributors but not having an official list editor/coordinator (lighter green), and those in need of an editor and/or contributors (white).

Patten, John Petranka, Bryan Pfeiffer, Bill Prather, Steve Roble, Mark Shields, George Sims, Jim Stuart, Jeanne Tinsman, Tim Vogt, Hal White, and Erin White. My sincere apologies if, in my rush to meet the publication deadline, I omitted anyone.

We are still in need of help with the project (Fig. 2). Some jurisdictions have contributors but still need someone who can become the dedicated editor (lighter green) and some of the editors currently cover multiple jurisdictions and might be willing to hand over responsibilities or co-contribute. I have already extended some requests for assistance with the project and have some additional prospects to ask, but if you are able to contribute, even with a jurisdiction colored on the map, please let me know.

As a teaser for the next installment of this series, I included a map that adds Mexico to the purview (Fig. 3; 362, 364, 162 species, as per Paulson and González-Soriano 2021, Biggs 2021, and OC, respectively). In this upcoming article, I would like to include details on both Mexico's state lists and country lists for the rest of Middle America. Inclusion of the Caribbean would be nice, too. If I can get some volunteers to be jurisdictional editors for those regions by next year, I think that installment will be realized. Anyone willing to help, please contact me.

And, in the meantime, upload records to OC!

## References

Biggs K. 2021. Distribución y Mapas de Libélulas y Caballitos del Diablo de México: Mexican Odonata Maps. Online



**Figure 3.** Odonate species richness in Canada, the United States, and Mexico. Note the potential different ways one could count the total for the United States, by 1) counting just “mainland”, i.e., the contiguous states, Washington DC, and Alaska (468 species), 2) also including Hawaii (adds 29,  $n = 497$ ), or 3) as Odonata Central does, which includes some outlying affiliated political entities such as Puerto Rico. Regardless of how one counts the United States total, it has the highest richness of the three countries because it spans subtropical, temperate, and boreal regions.

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