

The Canadian Field-Naturalist

News and Comment

Upcoming Meetings and Workshops

Alberta Chapter of The Wildlife Society Conference

The Alberta Chapter of The Wildlife Society Conference to be held 13–15 March 2020 at The Norsemen Inn, Camrose, Alberta. The theme of the con-

ference is: ‘Species on the Move’. Registration is currently open. More information is available at <https://www.actws.ca/conference/>.

Entomological Society of America, Joint North Central & Southwestern Branch Meeting

The 2020 Joint North Central & Southwestern Branch Meeting of the Entomological Society of America to be held 15–18 March 2020 at The Skirvin Hilton Oklahoma City, Oklahoma City, Oklahoma.

Registration is currently open. More information is available at <https://www.entsoc.org/2020-joint-northcentral-southwestern-branch-meeting>.

Eastern Bird Banding Association Meeting

The 97th meeting of the Eastern Bird Banding Association to be held 27–29 March 2020 at the Hilton Garden Inn Mystic/Groton, Groton, Connecticut. The theme of the conference is: ‘Using Bird Science

to Inform Conservation’. Registration is currently open. More information is available at <https://ebba2020.org/>.

Entomological Society of America, 2020 Joint Eastern & Southeastern Branch Meeting

The 2020 Joint Eastern & Southeastern Branch Meeting of the Entomological Society of America to be held 29 March–1 April 2020 at the Sheraton Atlanta Hotel, Atlanta, Georgia. Registration is cur-

rently open. More information is available at <https://www.entsoc.org/2020-joint-eastern-southeastern-branch-meeting>.

American Fisheries Society, Western Division and Washington-British Columbia Chapters Annual Meeting

The annual meeting of the Western Division and Washington-British Columbia Chapters of the American Fisheries Society to be held 13–17 April 2020 at the Pinnacle Harbourfront Hotel, Vancouver, British Columbia. The theme of the conference is:

‘Crossing Boundaries and Navigating Intersections’. Registration is currently open. More information is available at <https://wa-bc.fisheries.org/2020-meeting/>.

Northeast Natural History Conference

The 20th Northeast Natural History Conference to be held 17–19 April 2020 at the Hilton Stamford Hotel, Stamford, Connecticut. Registration is cur-

rently open. More information is available at https://www.eaglehill.us/NENHC_2020/NENHC2020.shtml.

Northeast Fish & Wildlife Conference

The 76th annual Northeast Fish & Wildlife Conference, hosted by the New Jersey Division of Fish and Wildlife, to be held 19–21 April 2020 at the Ocean Place Resort, Long Branch, New Jersey.

The theme of the conference is: ‘The Power of Partnerships’. Registration is currently open. More information is available at <http://www.neafwa.org/conference.html>.

Biodiversity Without Boundaries 2020 (NatureServe)

Biodiversity Without Boundaries 2020 to be held 19–22 April 2020 at the Richmond Marriott, Richmond, Virginia. Registration is currently open. More in-

formation is available at <https://www.natureserve.org/news-events/events/biodiversity-without-boundaries-2020>.

Entomological Society of America, Pacific Branch Meeting

The 104th annual meeting of the Pacific Branch of the Entomological Society of America to be held 19–22 April 2020 at The Centennial Hotel, Spokane,

Washington. Registration is currently open. More information is available at <https://www.entsoc.org/pacific/2020-branch-meeting>.

Wild *Canis* spp. of North America: a pictorial representation

There has been considerable discussion of hybridization in the genus *Canis* in North America with the general consensus that the western Coyote (*Canis latrans*), Eastern Timber Wolf (*Canis lycaon*), and Gray Wolf (*Canis lupus*) hybridized to produce the Eastern Coyote/Coywolf (*Canis latrans* var. or *Canis latrans* × *lycaon*) and Great Lakes Wolf (*Canis lupus* × *lycaon*) in eastern North America (Rutledge *et al.* 2012, 2015; Way 2013; Way and Lynn 2016; Heppenheimer *et al.* 2018). Way (2013) described the five types of wild canids (*Canis* spp.; foxes excluded) in North America and noted that these canid groups were useful even with the few studies that claim that the Eastern Timber Wolf is not a distinct species but rather a hybrid between western Coyotes and Gray Wolves (von Holdt *et al.* 2011, 2016), despite the lack of field evidence that these two species mate and produce viable offspring (e.g., see Mech *et al.* 2014).

A comprehensive review of the taxonomy of wolves in North America supports the Eastern Timber Wolf as a distinct taxon (Chambers *et al.* 2012) as has most of the research on canids in eastern North America (see references in Rutledge *et al.* 2015, but see vonHoldt 2011 countering this). With this “*Canis* soup” of different, but closely related, species (there is gene flow from *C. lycaon* to *C. lupus* and from *C. lycaon* to *C. latrans* [Way 2013; Heppenheimer *et al.* 2018]), distinct species status for any canid complicates conservation efforts (including *C. lupus* in eastern North America). Furthermore, the degree of hybridization and terminology associated with these hybrids can be confusing for the layperson, for example, Way and Lynn’s (2016) use of the term Coywolf

versus Wheeldon and Patterson’s (2017) use of the term Eastern Coyote.

Accordingly, we created a pictorial representation of *Canis* spp. in North America showing the six main types of canids: western Coyotes, Eastern Coyotes/Coywolves, Red Wolves, Eastern Timber Wolves, Great Lakes Wolves, and Gray Wolves (Figure 1). Because of the frequent separation of Red Wolf (*Canis rufus*), Eastern Timber Wolf, and Gray Wolf in analyses (e.g., von Holdt *et al.* 2011; Chambers *et al.* 2012) we show these canids separately even though others believe Red Wolf and Eastern Timber Wolf are the same species at opposite ends of their range (Wilson *et al.* 2000). This drawing represents average body sizes of one canid compared to another; however, it is important to realize the limitations of these average depictions. Even within a given type, males and females differ in size and there is considerable variation—where the size of one might be similar or even larger than the one adjacent. They may be difficult to tell apart in the field, not only from a distance, but even when captured, especially where their ranges overlap (e.g., in and around Algonquin Provincial Park, Ontario). This is further exemplified by Newsome *et al.* (2015) noting that even larger western Gray Wolves and smaller western Coyotes (which share no size overlap; Figure 1) are often difficult to tell apart from a distance and someone ‘shooting a coyote can sometimes result in a dead wolf’. Natural expansion or recolonization of a range is a confounding factor (e.g., Eastern Timber Wolves or Great Lakes Wolves dispersing into southern Canada and the northeastern USA are just claimed to be

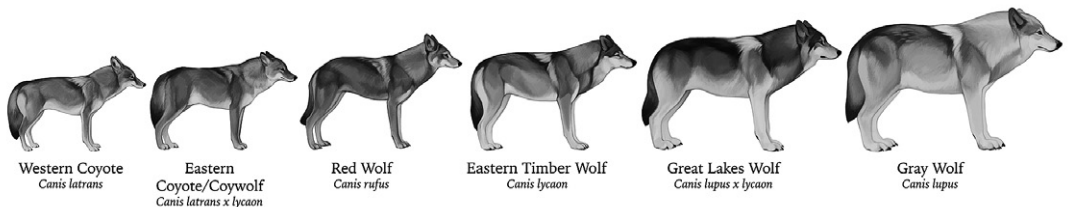


FIGURE 1. Wild *Canis* of North America. These drawings are intended to represent average body sizes of one canid compared to another. But within a given type, males and females differ in size and there is considerable variation such that the size of one might be similar or even larger than the one adjacent making them difficult to tell apart in the field, especially where ranges overlap. Also, while Red and Eastern Timber Wolf are considered separate here, many studies have indicated that they are possibly the same species (*Canis lycaon*) living on opposite ends of their eastern North American range. Drawings: J.L. Hirten.

heavy Eastern Coyotes). Often genetic testing is the only way to differentiate among *Canis* spp. in eastern North America (Rutledge *et al.* 2012).

Recent research acknowledges the importance of hybridization among closely related species and in the case of eastern wolves there is a need for managed introgression that focusses on preserving any eastern wolf genetic material in any genome regardless of their potential mosaic ancestry composition (Heppenheimer *et al.* 2018). If such an effort prioritizes and maintains individuals that carry admixed genomes, as Heppenheimer *et al.* (2018) suggest, then more common animals like the Eastern Coyote would be an important source of greater genetic variation and potential adaptive capacity. It is our hope that this diagram (Figure 1) is a useful guide to show the variation and types of *Canis* spp. in North America with a specific focus in eastern North America.

Literature Cited

- Chambers, S.M., S.R. Fain, B. Fazio, and M. Amaral.** 2012. An account of the taxonomy of North American wolves from morphological and genetic analyses. *North American Fauna* 77: 1–67. <https://doi.org/10.3996/nafa.77.0001>
- Heppenheimer, E., R.J. Harrigan, L.Y. Rutledge, K.-P. Koepfli, A.L. DeCandia, K.E. Brzeski, J.F. Benson, T. Wheeldon, B.R. Patterson, R. Kays, P.A. Hohenlohe, and B.M. von Holdt.** 2018. Population genomic analysis of North American eastern wolves (*Canis lycaon*) supports their conservation priority status. *Genes* 9: 606: 1–18. <https://doi.org/10.3390/genes9120606>
- Mech, L.D., B.W. Christensen, C.S. Asa, M. Callahan, and J.K. Young.** 2014. Production of hybrids between western gray wolves and western coyote. *PLoS ONE* 9(2): e88861. <https://doi.org/10.1371/journal.pone.0088861>
- Newsome, T.M., J.T. Bruskotter, and W.J. Ripple.** 2015. When shooting a coyote kills a wolf: mistaken identity or misguided management? *Biodiversity and Conservation* 24: 3145–3149.
- Rutledge, L.Y., S. Devillard, J.Q. Boone, P.A. Hohenlohe, and B.N. White.** 2015. RAD sequencing and genomic simulations resolve hybrid origins within North American *Canis*. *Biology Letters* 11: 20150303. <https://doi.org/10.1098/rsbl.2015.0303>
- Rutledge, L.Y., P.J. Wilson, C.F.C. Klutsch, B.R. Patterson, and B.N. White.** 2012. Conservation genomics in perspective: a holistic approach to understanding *Canis* evolution in North America. *Biological Conservation* 155: 186–192. <https://doi.org/10.1016/j.biocon.2012.05.017>
- von Holdt, B.M., J.A. Cahill, Z. Fan, I. Gronau, J. Robinson, J.P. Pollinger, B. Shapiro, B.J. Wall, and R.K. Wayne.** 2016. Whole-genome sequence analysis shows that two endemic species of North American wolf are admixtures of the coyote and gray wolf. *Science Advances* 2: e1501714. <https://doi.org/10.1126/sciadv.1501714>
- von Holdt, B.M., J.P. Pollinger, D.A. Earl, J.C. Knowles, A.R. Boyko, H. Parker, E. Geffen, M. Pilot, W. Jedrzejewski, B. Jedrzejewska, V. Sidorovich, C. Greco, E. Randi, M. Musiani, R. Kays, C.D. Bustamante, E.A. Ostrander, J. Novembre, and R.K. Wayne.** 2011. A genome-wide perspective on the evolutionary history of enigmatic wolf-like canids. *Genome Research* 21: 1294–1305. <https://doi.org/10.1101/gr.1163.01.110>
- Way, J.G.** 2013. Taxonomic implications of morphological and genetic differences in Northeastern Coyotes (Coywolves) (*Canis latrans* × *C. lycaon*), Western Coyotes (*C. latrans*), and Eastern Wolves (*C. lycaon* or *C. lupus lycaon*). *Canadian Field-Naturalist* 127: 1–16. <https://doi.org/10.22621/cfn.v127i1.1400>
- Way, J.G., and W.S. Lynn.** 2016. Northeastern coyote/coywolf taxonomy and admixture: a meta-analysis. *Canid Biology and Conservation* 19: 1–7. Accessed 11 October 2019. http://canids.org/CBC/19/Northeastern_coyote_taxonomy.pdf.
- Wheeldon, T.J., and B.R. Patterson.** 2017. Comment on “northeastern coyote/coywolf taxonomy”. *Canid Biology and Conservation* 20: 14–15. Accessed 11 October 2019. https://canids.org/CBC/20/Comment%20_on_Way_and_Lynn_2016.pdf.
- Wilson, P.J., S. Grewal, I.D. Lawford, J.N.M. Heal, A.G. Granacki, D. Pennock, J.B. Theberge, M.T. Theberge, D.R. Voigt, W. Waddell, R.E. Chambers, P.C. Paquet, G. Goulet, D. Cluff, and B.N. White.** 2000. DNA profiles of the eastern Canadian wolf and the red wolf provide evidence for a common evolutionary history independent of the gray wolf. *Canadian Journal of Zoology* 78: 2156–2166. <https://doi.org/10.1139/z00-158>

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In Memoriam: Francis Cook (3 March 1935–3 January 2020)

Francis Cook was the longest serving editor of *The Canadian Field-Naturalist*. He was editor of the journal for 34 years, from 1962 to 1966 and from 1981 to 2010. In total, Francis edited 35 volumes of *The Canadian Field-Naturalist*. He helped hundreds of researchers publish their work in the journal.

In addition to his work on *The Canadian Field-Naturalist*, Francis Cook was the Curator of Herpetology at what is now the Canadian Museum of Nature from 1960 to 1993, aside from a two-year educational leave to work on a Ph.D. at the University of Manitoba. Francis had a passion for herpetofauna that lasted a lifetime. He spent decades gathering data on the natural history of local amphibians near his home.

In 2018, Francis was awarded the Order of Canada for his research on amphibians and reptiles and for being the long-time editor of *The Canadian Field-Naturalist*. He was also honoured by the Ottawa Field-Naturalists' Club. He was selected as Member of Year in 1990 and 2010 for his efforts editing *The Canadian Field-Naturalist*, and he was made an Honorary Member of the Club in 1998 "For service

to the Club and herpetological work". Francis's exceptional contributions to our understanding of the natural history of amphibians and reptiles (detailed in Halliday and Seburn 2018; Seburn and Halliday 2018) were honoured in special issues (volume 132, issues 1 and 2) of *The Canadian Field-Naturalist*, with the content of those issues dedicated to studies on Canadian amphibians and reptiles.

Francis Cook died in Kemptville on 3 January 2020. Memorial donations may be made to *The Canadian Field-Naturalist* if desired; you may direct an e-transfer to treasurer@ofnc.ca with a note "Re: The Canadian Field Naturalist in Memory of Francis Cook".

Literature Cited

- Halliday, W.D., and D.C. Seburn.** 2018. Introduction to the Special Issue on herpetology in Canada. *Canadian Field-Naturalist* 132: 1–3. <https://doi.org/10.22621/cfn.v132i1.2113>
- Seburn, D.C., and W.D. Halliday.** 2018. The publications of Francis Cook. *Canadian Field-Naturalist* 132: 99–102. <https://doi.org/10.22621/cfn.v132i2.2169>

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