

# The Canadian Field-Naturalist

## SUPPLEMENTARY MATERIAL:

### Evolutionary isolation of Canadian terrestrial vertebrate species

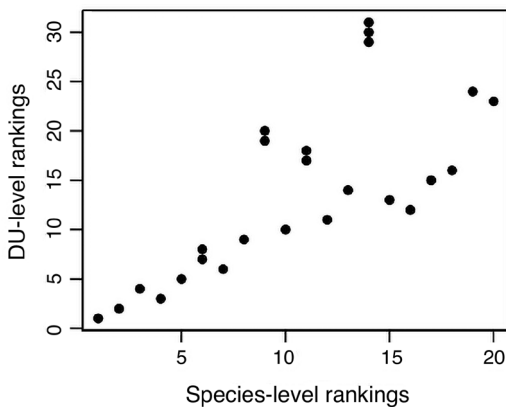
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#### APPENDIX S13. Calculating national evolutionary distinctiveness scores and rankings at the species-level.

While Canadian conservation priorities (at least at the national level) focus on “wildlife species”, which can include entities below the species level (which are generally called “designatable units” or DUs; COSEWIC 2020), calculating evolutionary distinctiveness (ED) scores at this level instead of at the species level is problematic. Calculations of ED at the DU level will result in lower scores and rankings for species with multiple DU designations. We used Canadian squamates to examine how ED scores and rankings would differ when calculated at the species and DU level.

We calculated ED scores for Canadian squamates at the DU level by adding DUs to the Canadian squamate phylogenies. Because COSEWIC considers post-glacial re-colonization a common mechanism of sub-specific divergence, we made each DU 10 000 years old. For species with more than two DUs, we created a polytomy, where all DUs were inserted at the 10000 year mark. We then recalculated ED scores and rankings for species and DUs from these updated trees.

The top 20 rankings for the species- and DU-level



**FIGURE S1.** Correlation of the top 20 evolutionary distinctiveness rankings when species are ranked at the designatable unit (DU) and species level.

rankings were similar ( $R = 0.74$ ; Figure S1); however, species with multiple DUs ranked lower in the DU-ranking list compared to their rankings at the species level. For instance, the three DUs of North American Racer (*Coluber constrictor*), originally ranked 15th, fell out of the top 20 to 29th, 30th, and 31st when ranked at the DU level. Importantly, DUs are only delineated when status is being assessed, i.e., when there is the suspicion that the species or a segment of the species is, in fact, at risk of extinction. For example, North American Racer is an at-risk species, with all three DUs assessed as either Threatened or Endangered by COSEWIC. If DU-level rankings are used to assist in prioritization exercises, at-risk species with multiple DUs may lose priority and the conservation attention they would otherwise receive based on species-level rankings.

Measuring ED scores at the DU level also provides a less stable ranking list as DUs are prone to change upon species reassessment and increasing data availability. A quick survey of COSEWIC reports (COSEWIC 2019) for species that have been assessed multiple times turns up many terrestrial vertebrate species where DU designations have clearly changed over time (e.g., American Badger [*Taxidea taxus*], Caribou [*Rangifer tarandus*], Wolverine [*Gulo gulo*], Loggerhead Shrike [*Lanius ludovicianus*], Massasauga [*Sistrurus catenatus*], Eastern Foxsnake [*Pantherophis vulpinus*], Western Toad [*Anaxyrus boreas*], and Tiger, Dusky, and Spring Salamanders [*Ambystoma tigrinum*, *Desmognathus ochrophaeus*, and *Gyrinophilus porphyriticus*]). These changes would result in subsequent changes of any ED scores and rankings calculated at the sub-specific level. Furthermore, the subspecific structure of species is almost exclusively known for those that have been assessed by COSEWIC. According to our analysis, only 23% of Canadian terrestrial vertebrates have been assessed by COSEWIC; we do not have sufficient information to produce reliable ED rankings for all Canadian species below the species level. As more species are assessed

and further studied, the species-level ED scores and ranking lists presented here will remain applicable to any future revisions.

### Literature Cited

**COSEWIC (Committee on the Status of Endangered Wildlife in Canada).** 2019. Canadian Wildlife Species at Risk. Committee on the Status of Endangered Wild-

life in Canada. Accessed 28 April 2020. <https://tinyurl.com/yckx7dbv>.

**COSEWIC (Committee on the Status of Endangered Wildlife in Canada).** 2020. COSEWIC guidelines for recognizing designatable units. Accessed 15 February 2023. <https://cosewic.ca/index.php/en/reports/preparing-status-reports/guidelines-recognizing-designatable-units.html>.