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REVIEWER'S REPORT

Manuscript No.: IJAR- 58542

Title:EARTHWORMS (ANNELIDA: OLIGOCHAETA) IN CAPE BRETON SOILS ACCORDING TO SOIL SERIES, AND THEIR IMPLICATIONS FOR AGRICULTURE

Recommendation:
Accept after minor revision

Rating	Excel.	Good	Fair	Poor
Originality		✔		
Techn. Quality			✔	
Clarity			✔	
Significance	✔			

Reviewer's ID: Bilqees Hamza

Detailed Reviewer's Report

The manuscript presents an empirical investigation into the ecological distribution and species composition of earthworm assemblages across Cape Breton Island, Nova Scotia. Drawing upon a sampling dataset of 114 collection sites and 332 individual specimens, the authors evaluate how European lumbricid species map onto distinct regional soil series, parent materials, and land-use histories.

The study relies on standard quantitative metrics—including Shannon diversity (H'), Pielou's evenness (J'), and ecological dissimilarity indices—to analyze community structures across Inverness, Richmond, Cape Breton, and Victoria counties. The results highlight a pronounced dominance of three primary European introduced species: *Aporrectodea tuberculata*, *Lumbricus rubellus*, and *Aporrectodea turgida*. Geographically, diversity varies significantly across soil orders, with acidic Podzols favoring litter-dwelling epigeic species, while clay and sandy loam tills support richer endogeic populations that contribute to soil aggregation and aeration. Crucially, the authors identify a widespread absent or near-absent functional guild: deep-burrowing anecic earthworms (*Lumbricus terrestris* and *Aporrectodea longa*). This absent guild represents a distinct ecological gap in deep vertical mixing and subsoil organic matter integration across the island's soil profiles.

Overall, the paper is well-structured and aligns with standard empirical frameworks (IMRAD). By providing quad-lingual abstracts—in English, French, Scots Gaelic, and Mi'kmaw—the authors

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contextualize their environmental research within the cultural and regional reality of Cape Breton. The findings offer valuable baseline ecological data that directly inform sustainable soil management, agricultural practice, and regional biodiversity conservation in Atlantic Canada.

Improvements Needed

While the study is methodologically sound and logically organized, several focused refinements would strengthen the clarity, rigor, and analytical depth of the manuscript prior to formal publication:

1. **Clarification of Sampling Effort and Density:** The text should provide explicit details regarding site selection criteria and local sampling intensity. It would be beneficial to clarify whether sampling volume or area was standardized across all 114 collection points to ensure that variation in species richness reflects true ecological patterns rather than discrepancies in field effort.
2. **Refinement of Quantitative Tabulations:** In the county-level and soil-series comparative tables, ensure that sampling parameters, total individual counts (G), and diversity index confidence intervals are uniformly reported. Adding basic variance estimates or standard error values for indices such as H' and J' would provide stronger statistical grounding for cross-county comparisons.
3. **Expanded Ecological Discussion on Functional Gaps:** The discussion regarding the near-absence of anecic species (*Lumbricus terrestris*) is a central contribution of this paper. The authors should briefly expand upon the underlying ecological drivers of this absence—specifically addressing whether it stems from physical dispersal limitations, historical introduction vectors, or adverse subsoil chemistry such as high acidity or compaction.
4. **Cartographic and Visual Enhancements:** If spatial maps or distribution plots are included, ensure that soil order boundaries (Podzols, Brunisols, Regosols) are distinctly overlaid with the 114 sampling coordinates. Distinguishing positive sampling locations from sites with zero yields would greatly enhance the visual readability of the geographic distribution patterns.

Recommendation to the Editor

Recommendation: Revisions Required (Minor Revision)

This manuscript offers a robust, methodologically rigorous, and ecologically valuable assessment of earthworm distribution and functional guild dynamics across Cape Breton Island. The dataset is well-analyzed, the ecological implications for regional agriculture are clearly articulated, and the manuscript fits comfortably within the scope of the journal.

The revisions requested above are minor and primarily involve clarifying sampling standardization, adding basic statistical variance metrics, and briefly elaborating on the mechanisms driving the observed anecic functional gap. These adjustments do not require additional field collection or fundamental

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restructuring of the text. Once the authors address these minor points of clarification and presentation, the manuscript will be fully suitable for publication.

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