

Supplement of

Thermokarst amplifies fluvial inorganic carbon cycling and export across watershed scales on the Peel Plateau, Canada

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10 RivEx workflow to assess RTS impact accumulation

To quantify the number of active retrogressive thaw slumps (RTSs) impacting streams in the Stony Creek watershed and to visualize RTS impact accumulation across the fluvial network (main text Sect. 2.6), we used RivEx 10.25 software (<http://www.rivex.co.uk>). Steps in the workflow included:

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1. Using the stream network delineated in ArcGIS 10.5 (main text Sect. 2.6), generated a pseudo-node free network using RivEx.

2. Ran Quality Control Tools (except monotonic trends) using RivEx and manually corrected stream network polylines as needed to ensure continuity (i.e. no erroneous breaks) and flow direction.

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3. Imported National Hydro Network (<https://open.canada.ca/data/en/dataset/a4b190fe-e090-4e6d-881e-b87956c07977>) shapefile of waterbodies (10MC002) to include lakes in study area. Removed impermanent lakes and lakes that were partially in study area ($n = 5$). Clipped remaining dataset to study area (Stony Creek watershed).

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4. Generated points at the intersections of stream and lakes. QA/QC'd stream intersections with lakes and adjusted as needed following visual assessment of geospatial topographic data (Canadian Digital Elevation Data).

5. Split streams at intersection points with a search radius of 5m.

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6. Assessed RTS impacts to stream segments and lake features on the basis of impact/no impact as well as RTS feature count. RTS features were interpreted to impact a stream or lake feature based on contact or interpreted down-slope flow based on slope direction and gradient from topographic data. Special considerations included:

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- a. Where a RTS impacted multiple stream segments, the upper-most stream segment was assigned the count value but all segments received an impact value.

- b. Where a RTS impacted a tributary and a mainstem, both segments were given an impact value; the upstream-most segment received the count.

- c. In cases where two or more headwater streams were impacted by a RTS, all streams were given an impact value, but the stream with the largest distance of contact with the RTS feature or the upper-most stream was given the count value.

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7. Using RivEx, assigned Strahler Order to stream segments and performed upstream accumulation for binary impacts and cumulative count.
 8. Attribute mapping completed for indirect impacts (i.e. streams/lakes affected by an upstream RTS) performing spatial queries with ArcMaps Data Management Tools.