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Geoconservation Monitoring Networks: Protecting the World's Oldest Complex Macrofossils in the Ediacaran of Newfoundland

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The late Ediacaran rocks of the Mistaken Point Ecological Reserve, Newfoundland, record the oldest known assemblage of large, complex fossils anywhere. These fossils represent the transition in the history of life on earth to large, architecturally complex organisms, following nearly three billion years of a microbially-dominated world. In July 2016, the Reserve was inscribed on World Heritage List. 200 km north in the Discovery Aspiring Geopark, similar Ediacaran palaeocommunities are found, alongside fossil evidence for the oldest known muscular animal, Haootia quadriformis. World Heritage Inscription, and the Global Geopark bid has led to increased geotourism demands on the localities, increasing the risk of damage to the geoheritage present, and increasing the need to understand this threat.

The total risk associated with a geosite is a product of both natural and anthropogenic processes. To better understand this complex mix, a Geoconservation Monitoring Network has been setup in both localities, including in-situ cameras, annual LiDAR surveys, periodic field observations, and community feedback mechanisms. Results show a significant threat to the fossil surfaces comes from slope failure of the overlying glacial gravels and boulders. In addition, experiments on the use of protective footwear to reduce visitor induced erosion of bedding surfaces reveals valuable insights on the appropriateness of commonly used footwear materials. Geoconservation Monitoring Networks provide the evidence and compelling imagery to inform policy makers on management policy, and should be considered in other at-risk geosites.