

# Outcrop Analysis of Trace Fossil Assemblages in the Toad Formation (Triassic), SE Yukon Territory: Implications for Hydrocarbon Exploration in NE British Columbia

Robert B. MacNaughton\*, John-Paul Zonneveld, and John Utting

Geological Survey of Canada (Calgary)

3303-33rd Street NW, Calgary, AB T2L 2A7

[romacnau@nrcan.gc.ca](mailto:romacnau@nrcan.gc.ca); [jzonneve@nrcan.gc.ca](mailto:jzonneve@nrcan.gc.ca); [jutting@nrcan.gc.ca](mailto:jutting@nrcan.gc.ca)

Trace fossil assemblages contribute significant data to studies of sedimentary environments and thus are commonly used in characterizing hydrocarbon-producing strata. However, in core-based subsurface studies, available trace fossils are largely restricted to vertical sections through burrows: horizontal views are limited. It is desirable to integrate outcrop and subsurface ichnological studies to facilitate effective use of subsurface data.

Triassic strata in the southeasternmost Yukon Territory (La Biche River map area; NTS 95 C) consist of interbedded shale, siltstone, and sandstone and are assigned to the Lower Triassic Toad Formation. Palynological data indicate a Griesbachian age for the the succession. Stratigraphic sections studied in outcrop contain a relatively diverse assemblage of well-preserved trace fossils.

Five facies associations are recognised within the succession, recording deposition on a wave-dominated shelf. Trace fossil diversity varies with environment. In distal shelf facies (shale and siltstone), diversity is low. Diversity is moderate to high in offshore transition to lower shoreface strata (sandstone and shale). Shoreface sandstone packages are effectively barren. The most common ichnofossils are burrow networks (*Thalassinoides*) and simple infaunal burrows (*Planolites*, *Palaeophycus*). Arthropods produced much of the ichnofauna, including forms more commonly associated with Paleozoic successions (*Cruziana*, *Rusophycus*).

The sedimentology and trace fossil assemblages of the Toad Formation in the La Biche River area are very similar to those of correlative, gas-producing strata (Montney Formation) in the subsurface of northeastern British Columbia. The Yukon succession thus augments exploration models for British Columbia that incorporate trace-fossil data obtained from drill core.