Benthic Invertebrate Assessment of the Neexdzii Kwa (Upper Bulkley River) — 2025

Executive Summary

S E R N B C

SOCIETY FOR ECOSYSTEM RESTORATION IN NORTHERN BRITISH COLUMBIA

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Prepared for the Wet'suwet'en Treaty Society

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on behalf of the Society for Ecosystem Restoration in Northern British Columbia

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Executive Summary

This report assesses the health of the Neexdzii Kwa (Upper Bulkley River) mainstem by examining the small invertebrates — insects, worms, and crustaceans — that live on the streambed. These benthic communities are widely used as biological indicators because different species thrive under different conditions: some tolerate pollution, while others require clean, well-oxygenated water. By identifying what lives where, we can read the river's condition without relying solely on water chemistry snapshots. This work was conducted in October 2025 on behalf of the Wet'suwet'en Treaty Society, with three replicate kick-net samples collected at each of three mainstem sites following the CABIN wadeable streams protocol. The assessment was undertaken to fill a data gap identified during companion restoration planning research on the watershed.

Results show a clear upstream gradient of improving stream health, from mild nutrient enrichment at BUL-01 near Houston to reference-quality condition at BUL-05 twenty-one kilometres upstream, below the McQuarrie Creek confluence. Every line of evidence examined — taxonomic composition, feeding strategy, tolerance-weighted indices, and multivariate ordination — pointed to the same pattern, and PERMANOVA confirmed the three sites support genuinely different communities rather than sampling variability.

Site-by-site summary:

- **BUL-01** (downstream, near Houston). Community shows signatures of nutrient enrichment: elevated midges (Chironomidae, 24%) and *Hydropsyche* (20% — a net-spinning caddisfly that filters fine particles in enriched reaches), with sensitive shredders at only 2%. EPT (mayflies, stoneflies, and caddisflies) proportion remains the majority (63%) but is reduced from 84% at BUL-05 upstream. HBI 4.14 (range 3.91–4.31 across replicates), "very good" with possible slight organic pollution. Consistent with the cumulative upstream pressures this site integrates — agricultural and cattle rangeland use through the valley, the Knockholt Landfill, and the Houston wastewater treatment plant outfall 500 m upstream.
- **BUL-04** (mid-reach, Knockholt Bridge, ~11 km upstream of BUL-01). Transitional zone with high within-site variability; HBI range 2.81–4.57 across three replicates spans three interpretation categories — a signature of patchy, heterogeneous condition.
- **BUL-05** (upstream, below McQuarrie Creek confluence, ~21 km upstream of BUL-01). 45 taxa, 84% pollution-sensitive mayflies, stoneflies, and caddisflies (EPT). HBI 2.58 (range 2.40–2.72), "excellent". Dominated by *Lepidostoma* (42%), a shredder associated with intact riparian habitat.

BUL-05 (upstream, below McQuarrie confluence) as reference baseline — with a caveat. BUL-05 represents the kind of condition expected in a healthy, minimally disturbed stream, making it a benchmark against which current and future impacted sites can be compared. BUL-05 sits immediately downstream of the McQuarrie Creek confluence, however, a cold-water tributary that may create locally favourable conditions not representative of the entire upstream mainstem.

Testing this would require benthic sampling at a mainstem site farther upstream, above the McQuarrie input. Our proposed monitoring design (the Recommendations section of the full report) includes such a site — BUL-06, on the mainstem just below the Richfield Creek confluence — as a first-step test: if the community there resembles BUL-05 (upstream reference), the reference interpretation strengthens; if it is closer to BUL-04 (mid-reach) or BUL-01 (downstream), additional sampling on McQuarrie itself would be needed to determine whether clean tributary input is masking mainstem condition.

Historical context — Pacific salmon and marine-derived nutrients. Historical Pacific salmon returns to the Upper Bulkley delivered a substantial marine-derived nutrient subsidy via spawning carcasses; those returns have declined. Present-day "reference" at BUL-05 (upstream) reflects a watershed in which the natural nutrient input pathway has diminished while anthropogenic inputs have grown elsewhere — sources that differ in form, timing, and co-contaminant load and therefore shape benthic communities differently. The gradient documented in this report should be read against that shifted baseline.

Temporal comparison at BUL-01 (downstream, near Houston). The 2025 community has shifted toward more pollution-tolerant species compared to 2004 and 2018 samples from the same reach — fewer mayflies, more midges and net-spinning caddisflies. The direction is consistent with increasing nutrient pressure over two decades. Sampling season varied across years (August to October) and invertebrate phenology across that window could account for some of the observed change, so the magnitude of any real trend is uncertain. Future monitoring at a consistent time of year will be needed to separate a real temporal trend from seasonal variability.

These results establish a baseline for benthic community condition across the Neexdzii Kwa mainstem. We recommend continuing standardized monitoring at these sites with concurrent water quality sampling, and expanding the monitoring network to include priority tributaries (Buck Creek, Maxan Creek) and an upstream mainstem site above the McQuarrie confluence. A proposed sampling design with specific site locations is presented in the Recommendations section of the full report.