



Helbing/Langlois Laboratory eDNA Technical Bulletin

All eDNA tools are validated through a rigorous multi-step evaluation protocol that includes tests of DNA target specificity and amplification sensitivity¹⁻³.

General eDNA Assay Information

Target Species: Reindeer (*Rangifer tarandus*)
Species Code: ma-RATA

eDNA qPCR Tool: ma-eRATA3
eDNA qPCR Format: TaqMan

Gene Target: MT-ND5
Published in:

eDNA Assay Sensitivity Test Summary using gBlocks™ Synthetic DNA

LOD 0.1 95% CI 0.1-0.2 Copies/Rxn LOQ 0.5 95% CI 0.4-0.8 Copies/Rxn LOB 0 hits/8
LOQ_{continuous} 4 Copies/Rxn

Binomial-Poisson model for 8 technical replicates determined using eLowQuant R code⁴.

When the LOQ < LOD, use the LOD for the LOQ.

Enzyme: Immolase

eDNA Assay Specificity Test Information

Each qPCR reaction in the specificity assay contained 10 picograms of voucher target gDNA (n=25 technical replicates)

Species	Common Name (<i>Species</i>)	Detection	# Voucher	
			Specimens	Sample Sources/Locations
ma-RATA	Reindeer (<i>Rangifer tarandus</i>)	Yes	5	MFFP
ma-ALCA	American moose (<i>Alces americanus</i>)	No	10	MFFP
ma-ODVI	White-tailed deer (<i>Odocoileus virginianus</i>)	No	10	MFFP
ma-ODHE	Mule deer (<i>Odocoileus hemionus</i>)	No	5	MFFP
ma-CALUfa	Canine (<i>Canis lupus familiaris</i>)	No	1	INRS
ma-FECA	Cat (<i>Felis catus</i>)	No	1	INRS
ma-HOSA	Human (<i>Homo sapiens</i>)	No	1	INRS

References

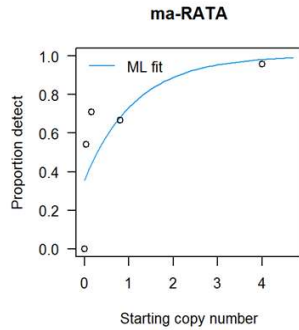
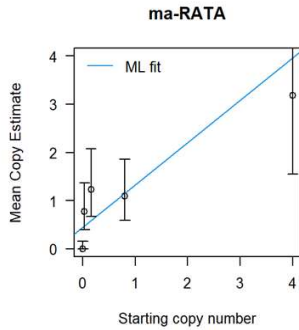
- Hobbs, J, Adams, IT, Round, JM, Goldberg, CS, Allison, MJ, Bergman, LC, Mirabzadeh, A, Allen, H, Helbing, CC (2020) Revising the range of Rocky Mountain tailed frog, *Ascaphus montanus*, in British Columbia, Canada, using environmental DNA methods. *Environmental DNA*, 2: 350-361. <https://doi.org/10.1002/edn3.82>
- Hobbs, J, Round, JM, Allison, MJ, Helbing, CC (2019) Expansion of the known distribution of the coastal tailed frog, *Ascaphus truei*, in British Columbia, Canada, using robust eDNA detection methods. *PLOS ONE* 14(3): e0213849. <https://doi.org/10.1371/journal.pone.0213849>
- Langlois, VS, Allison, MJ, Bergman, LC, To, TA, and Helbing, CC (2020) The need for robust qPCR-based eDNA detection assays in environmental monitoring and risk assessments. *Environmental DNA*, 3: 519-527. doi: 10.1002/edn3.164
- Lesperance, M, Allison, MJ, Bergman, LC, Hocking, MD, and Helbing, CC (2021) A statistical model for calibration and computation of detection and quantification limits for low copy number environmental DNA samples. *Environmental DNA*, 3: 970-981. doi: 10.1002/edn3.220



eDNA Assay Sensitivity Test Details using gBlocks™ synthetic DNA

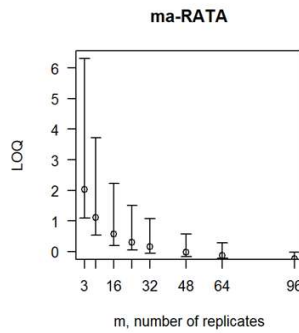
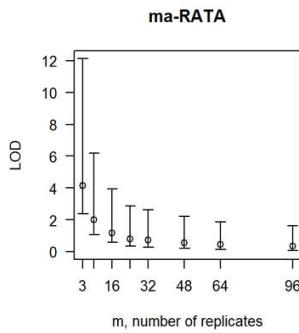
To generate tables for different numbers of replicates, use raw csv data files.

From 8 Technical Replicates

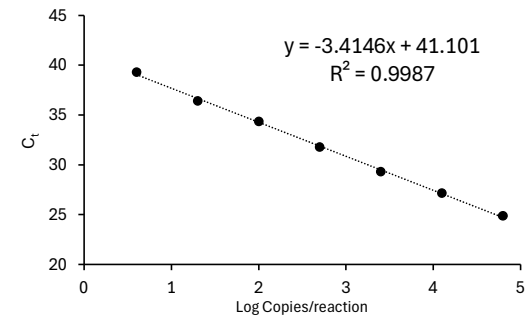


# Detects	# Copies	SE
0	0	0
1	0.051	0.052
2	0.11	0.08
3	0.18	0.109
4	0.266	0.142
5	0.376	0.184
6	0.531	0.249
7	0.797	0.379

Determined using eLowQuant R code⁴.



Applied to reactions with $\geq 95\%$ positive hits



Binomial-Poisson model: No intercept

Determined using eLowQuant R code⁴.

Based on a 2 μ L DNA input in a total 15 μ L reaction

Field Sample Validation

Sample Type	Known		Detected	Location
	Presence	# Samples		
Water	Y	2	Y	Caribou remote zone Val d'Or, Québec
Soil	Y	1	Y	Caribou remote zone Val d'Or, Québec

Abbreviations

95% CI	95% Confidence interval	LOQ	Limit of quantification
eDNA	Environmental DNA	MT-ND5	Mitochondrial NADH dehydrogenase 5
gDNA	Total genomic DNA extracted from voucher specimen	NTC	qPCR no template control
LOB	Limit of blank	qPCR	Quantitative real-time polymerase chain reaction
LOD	Limit of detection	SE	Standard error