

Interpretation of Result Files for eDNA Water Testing

This Technical Note provides information on each csv file reported for eDNA in water testing, to assist with the interpretation of eDNA results. For eDNA testing in water samples, up to four csv result files are reported for each sample submitted for testing.

The csv files are:

- Detailed file The detailed file contains complete information on taxonomic assignments and sequence metadata.
- Summary file The summary file provides an overview of detected species and their taxonomy.
- Metadata file The metadata file contains Taxon-Independent Community Index (TICI) scores and client supplied information relating to sample site and sample collection.
- Flagged file The flagged file identifies if there is any notifiable and unwanted organisms as per MPI regulations.

Below is a brief description of each file containing key biodiversity and ecological assessment information.

1. Detailed file (eDNA-Detailed)

The detailed file contains complete information on taxonomic assignments and sequence metadata.

Column header definitions are:

Lab Number	Hill Labs job number assigned to the samples submitted for analysis.
Sample Name	Client supplied Sample Name for samples submitted for analysis.
LCA	The Least Common Ancestor (LCA) is the most specific taxonomic level that all matched DNA sequences share. It represents the scientific name at the lowest common classification. For example, if a DNA sequence matches multiple species within the same genus but cannot be confidently assigned to a single species, the LCA would be the genus name, as it is the most precise shared classification.
Taxonomic Rank	Lowest level of taxonomy to which the organism was classified (from species up to superkingdom).
Superkingdom	Superkingdom within which the organism was classified.
Kingdom	Kingdom within which the organism was classified.
Phylum	Phylum within which the organism was classified.
Class	Class within which the organism was classified.
Order	Order within which the organism was classified.
Family	Family within which the organism was classified.
Genus	Genus within which the organism was classified.
Species	Species within which the organism was classified.
TaxonID	TaxonID associated with the scientific name in NCBI (National Center for Biotechnology Information). If empty, it's likely that the TaxonID is missing for the taxonomic rank.
Frequency	The number of DNA sequences (reads) identified from a single primer set that are associated with a particular organism. This reflects the presence of an organism's DNA, not the number of individual organisms. While higher frequencies may indicate greater abundance, they can be affected by various technical and biological factors.
Fasta	DNA sequence representing the organism.
Max Bitscore	A score used in DNA sequence matching to measure how strong a match is between a sample and a known reference DNA sequence. The value refers to the highest bitscore returned, which means a stronger, more reliable match.

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Max Pident	Max Pident (Maximum percentage Identity) represents the highest percentage of similarity between a DNA sequence in a sample and a reference sequence in the database. A 100% Max Pident means a perfect match, while a lower value indicates some differences between the sequences.
NZ Status	A consensus status for the presence of the organism in New Zealand, based on information from the Global Biodiversity Information Facility (GBIF-NZ) and the New Zealand Organisms Register (NZOR).
Common Name	Common name associated with the organism, if known.
Group	Group that the organism belongs to, for example, fish, birds, etc.
Broad Taxonomic Group	Broader taxonomic group that the organism belongs to, for example, vertebrates, plants, bacteria, etc.
Primer Loc ID	ID of the target specific primer.
Final Collapsed OTU ID	An ID for OTUs (Operational Taxonomic Units).

An example of the detailed file is shown below:

	A	B			С		D	E		F	G		H		1	J	
1	Lab Number	Sample Name	LC	A		Taxono	mic Rank	Super King	dom	Kingdom	Phylum	Class	;	Order		Family	
2	3791441	.1 Site 1, Rep 1 - Waikato Riv	er Ag	aricomyce	tes	class		Eukaryota		Fungi	Basidiomycota	Agar	icomycetes				
3	3791441	.1 Site 1, Rep 1 - Waikato Riv	er Ar	icistrum		genus		Eukaryota			Ciliophora	Oligo	hymenophorea	Thigmotri	ichida	Ancistridae	
4	3791441	.1 Site 1, Rep 1 - Waikato Riv	er Ap	ocarchesi	um rosettum	species	5	Eukaryota			Ciliophora	Oligo	hymenophorea	Sessilida		Vorticellidae	
5	3791441	.1 Site 1, Rep 1 - Waikato Riv	er As	ajirella gel	latinosa	species	;	Eukaryota		Metazoa	Bryozoa	Phyla	actolaemata			Lophopodidae	
6	3791441	.1 Site 1, Rep 1 - Waikato Riv	er As	comorpha	ovalis	species	;	Eukaryota		Metazoa	Rotifera	Euro	tatoria	Ploima		Gastropidae	
7	3791441	.1 Site 1, Rep 1 - Waikato Riv	er Au	, lacoseira (distans	species	;	, Eukaryota			Bacillariophyta	Cosc	inodiscophyceae			Aulacoseiraceae	e
8	3791441	.1 Site 1. Rep 1 - Waikato Riv	er Au	ulacoseira r	nvassensis	species	;	, Eukarvota			Bacillariophyta	Cosc	inodiscophyceae			Aulacoseiraceae	e
9	3791441	.1 Site 1, Rep 1 - Waikato Riv	er Bi	stichella	,	genus		Eukarvota			Ciliophora	Spire	trichea				
10	3791441	.1 Site 1, Rep 1 - Waikato Riv	er Ce	ratiaceae		family		Eukarvota				Dino	phyceae	Gonvaula	cales	Ceratiaceae	
11	3791441	.1 Site 1. Rep 1 - Waikato Riv	er Ce	ratium		genus		Eukarvota				Dino	phyceae	Gonvaula	cales	Ceratiaceae	
12	3791441	.1 Site 1, Rep 1 - Waikato Riv	er Ch	lamvdodo	ntida	order		Fukarvota			Ciliophora	Phyl	opharvngea	Chlamydd	odontida		
13	3791441	1 Site 1 Rep 1 - Waikato Riv	er Ch	lamydomr	nadales	order		Eukarvota		Viridinlanta	e Chlorophyta	Chlo	ronhyceae	Chlamydo	omonadale	5c	
14	3791441	1 Site 1 Rep 1 - Waikato Riv	er Ch	loronhyta		phylun	1	Eukarvota		Viridiplanta	e Chlorophyta			,		-	
15	3791441	1 Site 1, Rep 1 - Waikato Riv	er Ch	oreotrichi	da	order		Eukaryota		· · · · · · · · ·	Ciliophora	Spire	trichea	Choreotri	ichida		
	0,0111			01000110111				Landiyota			enropinora	opire		onorcour			
	К	L	Μ	N	0	Р	Q	R		S	Т		U		V	W	
G	enus	Species T	axonID	Frequency	Fasta	Max Bitscore	Max Pident	NZ Status	Com	imon Name	Group		Broad Taxonomic Gro	oup Prime	er Loc ID F	inal Collapsed OTU ID)
			155619	•	9 GTTACTACCGAT	100	98.24	5 YES			Mushroom-forming	fungi	Microeukaryotes		2		1
A	ncistrum		880989	,	5 GCTCCTACCGAT	182	96.39	5 YES					Microeukaryotes		2		2
A	pocarchesium	Apocarchesium rosettum	703565		6 GCTTTTACCGAT	185	99.03	8 Unknown					Microeukaryotes		2		3
A	sajirella	Asajirella gelatinosa	350073	5	3 GCTACTACCGAT	228	98.4	5 YES			freshwater moss ani	mals	Invertebrates		2		4
A	scomorpna	Ascomorpha ovalis	360655		8 GCTACTACCGAT	23	99.23	/ YES			Rotifera		Invertebrates		2		5
A	ulacoseira	Aulacoseira distans	49233	, :	9 GCALCTALCGA	23:	100	J YES			Centric Diatoms		Microeukaryotes		2		0
A	ulacoseira	Aulacoseira nyassensis	202473		4 GCALCTALLGAT	23:	100	J YES			Centric Diatoms		Microeukaryotes		2		-
ы	stichella		20451		O GETECTACEGAT	200	97.	5 Unknown					Microeukaryotes		2		8
-	aratium		39451	. 1	3 GETECTACEGAT	10:	94.49						Microeukaryotes		2		10
u	eratium		2913	7	2 GUTUUTAUUGAT	180	90.3	S TES					Microeukaryotes		2		10
			206897		4 GUILLUTALLUAT	150	91.22				Groop Algao		Microeukaryotes		2		12
			3042	. 2	7 GETECTACEGAT	220	0.000	7 VEC	Graa	n algae	Green Algae		Microeukaryotes		2		12
			3041	12	A COTOCTACCOAT	17	92.85		Gree	en algae	Green Aigae		Microeukaryotes		2		1.0
			200000	12	4 OCTOCIACCOAT	17.	92	165					whereeukaryotes		2		14

2. Summary file (eDNA-Summary)

The summary file provides an overview of detected species and their taxonomy.

Column header definitions are:

Scientific Name	Scientific name of the identified organism.
Taxonomic Rank	Lowest level of taxonomy to which the organism was classified (from species up to superkingdom).
Common name	Common name associated with the organism, if known.
Group	Group that the organism belongs to, for example, fish, birds, etc.
Broad Taxonomic Group	Broader taxonomic group that the organism belongs to, for example, vertebrates, plants, bacteria etc.

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TaxonID	TaxonID associated with the scientific name in NCBI (National Center for Biotechnology Information). If empty, it's likely that the TaxonID is missing for the taxonomic rank.
Read Count	The total number of DNA sequences (reads) summed across multiple primer sets that are associated with an organism in a sample. Read count reflects DNA presence rather than the actual number of organisms. Higher read counts may suggest higher abundance but are influenced by many variables.
Lab Numbers	
	Hill Labs job number assigned to the samples submitted for analysis.
Sample Names	
	Client supplied Sample Name for samples submitted for analysis.

An example of the Summary file is shown below:

	Α	В	С	D	E	F	G	Н	L I	J
1						Sample Names:	Site 1, Rep 1 - Waikato River	Site 1, Rep 2 - Waikato River	Site 1, Rep 3 - Waikato River	Site 1, Rep 4 - Waikato River
2						Lab Numbers:	3791441.1	3791441.2	3791441.3	3791441.4
3	Scientific Name	Taxonomic Rank	Common Name	Group	Broad Taxonomic Group	TaxonID	Read Count	Read Count	Read Count	Read Count
4	Gobiomorphus cotidianus	species	toitoi, common bu	Ray-Finned Fish	Vertebrates	226931	925	414	349	210
5	Cyprinus carpio	species	Koi carp	Ray-Finned Fish	Vertebrates	7962	878	125	31	214
6	Mugil cephalus	species	Kanae, kanae rauki	Ray-Finned Fish	Vertebrates	48193	691	129	0	337
7	Gobiomorphus breviceps	species	Upland bully	Ray-Finned Fish	Vertebrates	300741	664	247	141	152
8	Carassius auratus	species	Morihana	Ray-Finned Fish	Vertebrates	7957	479	629	385	239
9	Porphyrio porphyrio	species		Birds	Vertebrates	171406	319	0	0	0
10	Gambusia affinis	species	Mosquitofish	Ray-Finned Fish	Vertebrates	33528	318	0	0	0
11	Retropinna retropinna	species	Common smelt, po	Ray-Finned Fish	Vertebrates	170203	168	0	81	367
12	Scardinius erythrophthalmus	species	Rudd	Ray-Finned Fish	Vertebrates	58319	138	159	121	0
13	Cheimarrichthys fosteri	species	Panoko, panokono	Ray-Finned Fish	Vertebrates	206139	28	0	0	0
14	Galaxias rostratus	species		Ray-Finned Fish	Vertebrates	613163	14	0	53	0
15	Gobiomorphus dinae	species		Ray-Finned Fish	Vertebrates	2872015	5	0	4	0
16	Ceratophyllum demersum	species	Hornwort	Dicot Flowering P	Plants	4428	10099	8318	9222	8398

3. Metadata file (eDNA-Metadata)

The Metadata file contains information associated with the sample collection as supplied by the client, as well as the Taxon-Independent Community Index (TICI) score, calculated based on the previously published methodology (Wilkinson et al., 2024). TICI indicates the overall health of riverine ecosystems using the eDNA sequences detected in the samples.

Column header definitions are:

Lab Number	Hill Labs job number assigned to the samples submitted for analysis.
Sample Name	Client supplied Sample Name for samples submitted for analysis.
Date Filtered	Date sample was taken.
Time Filtered	Time sample was taken.
GPS Latitude	Latitude GPS coordinates.
GPS Longitude	Longitude GPS coordinates.
Volume Filtered (mL)	Volume of water filtered during sample collection.
Environment Type	Type of aquatic environment from which the samples were collected (river/stream, lake, pond, estuary, mariner, other).
TICI Score	Taxon-Independent Community Index (TICI) scores for individual sample.
Average TICI Score (reported for jobs containing replicate samples)	Mean of TICI scores for all the samples associated with the site.

An example of the Metadata file is shown below:

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	A	В	С	D	E	F	G	Н	1	J
1	Lab Number	Sample Name	Date Filtered	Time Filtered	GPS Latitude	GPS Longitude	Volume Filtered	Environment Type	TICI Score	Average TICI Score
2	3791441.1	Site 1, Rep 1 - Waikato River	8/04/2025	9:30	-38.02688	175.324626	75	Lake	78.07	77.36
3	3791441.2	Site 1, Rep 2 - Waikato River	8/04/2025	11:30	-37.954014	172.287122	64	Wetland	79.92	77.36
4	3791441.3	Site 1, Rep 3 - Waikato River	8/04/2025	12:30	-37.941902	175.319414	60	Pond	74.87	77.36
5	3791441.4	Site 1, Rep 4 - Waikato River	8/04/2025	13:30	-37.950791	175.320212	70	River / Stream	76.59	77.36

TICI scores reflect qualitative ranking of the health of the riverine system as described by Wilkinson et al., 2024.

TICI Score	TICI Value
< 80	Very Poor
80 – 90	Poor
90 – 100	Average
100 – 110	Good
110 – 120	Excellent
> 120	Pristine

4. Flagged file (eDNA-Flagged)

The Flagged file contains any notifiable and unwanted organisms identified in the submitted samples, as defined by the Ministry of Primary Industries (MPI). A Flagged file will only be provided where notifiable or unwanted organisms are detected.

Column header definitions are:

Lab Number	Hill Labs job number assigned to the samples submitted for analysis.
Sample Name	Client supplied Sample Name for samples submitted for analysis.
Date Filtered	Date sample was taken.
Time Filtered	Time sample was taken.
GPS Latitude	Latitude GPS coordinates.
GPS Longitude	Longitude GPS coordinates.
Scientific Name	Scientific name of the identified organism.
Common Name	Common name associated with the organism, if known.
Туре	Group that the organism belongs to, as defined by MPI.
Notifiable	'Yes' will appear in this column if the organism is a notifiable species. 'No' will appear in this column if the organism is a not a notifiable species
Unwanted	'Yes' will appear in this column if the organism is an unwanted species. 'No' will appear in this column if the organism is a not an unwanted species

An example of the Flagged file is shown below:

	А	В	С	D	E	F	G	н	1	J	K
1	Lab Number	Sample Name	Date Filtered	Time Filtered	GPS Latitude	GPS Longitude	Scientific Name	Common Name	Туре	Notifiable	Unwanted
2	3791441.1	Site 1, Rep 1 - Waikato River	8/04/2025	9:30	-38.02688	175.324626	Ceratophyllum demersum	Coon's-tail, Hornwort	Plant	No	Yes
3	3791441.1	Site 1, Rep 1 - Waikato River	8/04/2025	9:30	-38.02688	175.324626	Cyprinus carpio	Koi carp, European carp	Fish	No	Yes
4	3791441.1	Site 1, Rep 1 - Waikato River	8/04/2025	9:30	-38.02688	175.324626	Gambusia affinis	Mosquitofish	Fish	No	Yes
5	3791441.2	Site 1, Rep 2 - Waikato River	8/04/2025	11:30	-37.954014	172.287122	Ceratophyllum demersum	Coon's-tail, Hornwort	Plant	No	Yes
6	3791441.2	Site 1, Rep 2 - Waikato River	8/04/2025	11:30	-37.954014	172.287122	Cyprinus carpio	Koi carp, European carp	Fish	No	Yes
7	3791441.3	Site 1, Rep 3 - Waikato River	8/04/2025	12:30	-37.941902	175.319414	Ceratophyllum demersum	Coon's-tail, Hornwort	Plant	No	Yes
8	3791441.3	Site 1, Rep 3 - Waikato River	8/04/2025	12:30	-37.941902	175.319414	Cyprinus carpio	Koi carp, European carp	Fish	No	Yes
9	3791441.4	Site 1, Rep 4 - Waikato River	8/04/2025	13:30	-37.950791	175.320212	Ceratophyllum demersum	Coon's-tail, Hornwort	Plant	No	Yes
10	3791441.4	Site 1, Rep 4 - Waikato River	8/04/2025	13:30	-37.950791	175.320212	Cyprinus carpio	Koi carp, European carp	Fish	No	Yes

Reference:

Wilkinson SP, Gault AA, Welsh SA, Smith JP, David BO, Hicks AS, Fake DR, Suren AM, Shaffer MR, Jarman SN, Bunce M (2024). TICI: a taxon-independent community index for eDNA-based ecological health assessment. PeerJ. DOI: 10.7717/peerj.16963

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