LIFE AQUATIC WARBLERS ON THE MOVE

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Table of Contents

Table of figures

Table of tables

Executive summary

Activities related to food availability at stopover and wintering sites form an important part of the LIFE AWOM project. To inform entomological sampling, additional knowledge on the Aquatic Warbler's diet was required. For this purpose, faecal samples were collected in Spain in 2025 during both spring and autumn migration. Although the number of samples was very small (6 in spring and 9 in autumn), limiting the possibility of drawing firm conclusions, some consistent patterns emerge. The analysis indicates a marked preference for *Diptera*, *Hemiptera*, and *Arachnida*, aligning with the results of a 2024 metabarcoding study conducted in France.

1. Introduction

For a migratory species such as the Aquatic Warbler (AW), the successful completion of the annual life cycle depends on the availability of high-quality stopover sites along the migration route as well as suitable wintering habitats.

The use of wetlands by AWs provides a first indication of habitat suitability, yet habitat use alone may not fully reflect actual habitat quality. Since ecological requirements of the species are well known, vegetation structure can also serve as an indicator of site quality. However, at stopover and wintering sites, birds primarily seek food sources that allow them to accumulate fat reserves for onward migration or for the return journey to breeding grounds. Thus, assessing food availability is essential for evaluating the suitability of sites for the AW.

Within the LIFE Aquatic Warblers on the Move (AWOM) project, analyses of food availability are planned at selected stopover and wintering sites, with the objective of linking prey abundance to habitat structure. To ensure that these analyses are meaningful, they must focus on arthropod groups that are actually consumed by the species. Therefore, selecting the most appropriate entomological sampling methods traps requires prior knowledge of the AW diet.

Previous diet studies have been conducted in several European countries, including Spain and France, by identifying chitinous arthropod remains in faeces. In 2024, a French study was conducted to obtain more information through metabarcoding, using eDNA contained in faecal samples. This innovative method has not yet been applied in Spain, therefore, as one of the objectives of the LIFE AWOM project, metabarcoding analyses on faeces from AWs captured in Spain was performed, in order to deepen knowledge of the species' diet on the Iberian Peninsula.

This report presents the results of faeces collection and analysis carried out in the Iberian Peninsula in 2025 during both spring and autumn migration. The findings are compared with existing results from the metabarcoding study in France to provide a broader understanding of the AW diet across regions.

2. Previous results from European studies

Two main methods can be used to study the diet of the AW at stopover and wintering sites. The first relies on the manual identification of chitinous arthropod remains found in faeces. The second uses metabarcoding, a faster technique that allows for more comprehensive prey detection through eDNA contained in faecal samples, although it is more costly.

Studies based on the manual identification of chitinous arthropod remains have already been conducted in France and Spain.

In France, results have been published for four sites:

- Audierne Bay (Kerbiriou *et al.*, 2011),
- Gironde Estuary (Musseau *et al.*, 2014),
- Seine Estuary (Provost *et al.*, 2010), and
- Brière Marsh (Marquet *et al.*, 2014).

Across the four sites, results are broadly consistent. *Diptera*, *Hemiptera* (including both *Heteroptera* and *Homoptera*), and *spiders* represent the most abundant and frequent prey groups. *Hymenoptera*, *Coleoptera*, *Orthoptera*, and *Odonata* also contribute significantly to prey abundance and occurrence at some sites.

In Spain, results have been published for one site:

- El Villar Lagoon (Miguélez *et al.*, 2016).

The main arthropod groups identified there, both in terms of occurrence (O) and proportion of prey numbers (A), are *spiders* (O = 91.7%; A = 21.5%), *Heteroptera* (O = 75.0%; A = 21.5%), *Homoptera* (O = 83.3%; A = 18.5%) and *Diptera* (O = 66.7%; A = 12.3%). *Hymenoptera* (O = 58.3%; A = 10.8%), *Coleoptera* (O = 50.0%; A = 9.2%) and *Orthoptera* (O = 16.7%; A = 3.1%) also represent a notable share of the prey occurrence and abundance.

A metabarcoding study conducted in France in 2024 provides complementary insights. Preliminary results from 65 faecal samples collected across thirteen French sites appear to confirm the trends identified (Alonso *et al.*, 2026, *in preparation*). In terms of occurrence, the most important groups of arthropods identified are *Diptera*, *Hemiptera* and *spiders*, with additional substantial presence of *Collembola* – an order that cannot be reliably detected through the method of chitinous arthropod remains identification, as well as *Lepidoptera* and *Hymenoptera*.

3. Protocol

3.1 Faeces collection on the field

Faeces are collected during ringing activities. The protocol used across the LIFE AWOM project was developed within the French Species Action Plan (SAP). According to this

protocol, two elements must be prepared at the start of each ringing session:

- A paper bag fitted with a wire mesh at the bottom and a paper or cardboard strip underneath (Knutie and Gotanda protocol, 2018), closed with two clothespins. Bags awaiting use or containing birds are to be kept in a dedicated, clean, quite area, protected from heat and humidity.
- A tube filled with 96% undenatured ethanol, labelled with a unique identification number.

Additional equipment required includes:

- Single-use gloves, changed between each handling of faeces, avoiding contact between successive pairs.
- Flexible forceps.
- A small bottle of bleach, used to disinfect the forceps between samples.
- Absorbent kitchen paper to dry the forceps after disinfection.

When an AW is captured, it is placed in the paper bag for a maximum of 5 minutes before release. Release is carried out by simply opening the bag, without additional handling, and always in a clear, unobstructed space.

During the Spanish faeces collection campaign, captured AWs were placed directly into the paper bags and remained there until ringing. When a second person was available to assist with extraction from the net, a piece of cardboard was positioned beneath the net to collect any faeces dropped before the bird was removed.

After the bird is released, the bag is fully opened by cutting the four corners. The paper strip is then removed, and any faeces present are transferred into the tube (**Figure 1**), using a stirring rod if needed. Samples consisting only of whitish, liquid material should not be kept, as this is urea. A suitable faecal sample contains at least one solid component; when possible, only this part should be preserved. In hot weather, a small cooler bag can be useful for transporting the equipment.

Figure 1: *Aquatic Warbler faeces collection process in La Nava lagoon (Palencia, Spain). Photo by FGN, 08-2025*

The tube number must be recorded on the ringing sheet, and the bird's ring number must be written on the tube.

If samples must be stored before shipment, they should be kept away from light and, if possible, in a cool place. The best option is to store the samples in a freezer at -18 °C, however, it is important that samples not undergo repeated freeze-thaw cycles, as this degrades DNA. Freezing should therefore be used only as the final storage step before sending samples to the laboratory.

3.2 Analysis in laboratory

The diet analysis was carried out using eDNA metabarcoding, a method that enables the identification of nearly all arthropod taxa present in a faecal sample, including those lacking chitinous structures. All samples were processed at the Conservation Genetics Laboratory of the University of Liège in Belgium.

The CO1 marker was used, allowing the extraction of 133-base pair DNA sequences from animal taxa. These sequences were compared with the BOLD reference database, which includes both chordate and non-chordate species.

In the results, only sequences with a match distance above 80% and a match greater than 90% were retained. Identifications below these thresholds, can be considered insufficiently relevant.

The results are compiled in a table that includes the sample name, the taxonomic assignment from phylum to the species, the percentage match, any relevant comments, and information on the likely mode of prey capture (for example, whether the species is typically taken 'in flight' or 'on the ground'.

Following laboratory analysis, several recommendations were provided regarding the interpretation of the results; these are presented in **Annex I**.

4. Spring migration

4.1 Results

Six AW faecal samples were collected during spring migration in Spain in 2025, at three distinct wetlands: Prat de Cabanes-Torreblanca, Marjal de Nules, and Laguna Pedraza (**Figure 2**; **Table 1**).

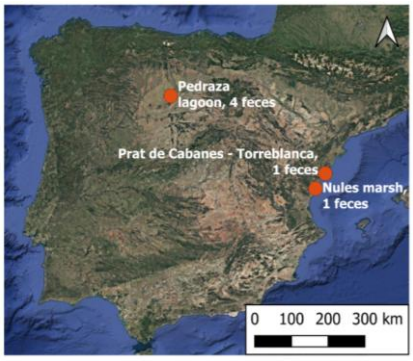

Figure 2: *Spanish wetlands where faecal samples were collected during spring migration.*

Table 1: *Information concerning the six faecal samples collected during spring migration in Spain.*

Ring code	Age	Date	Site (wetland name)	Locality	Province	Observations
2Y52091	4	06/04/2025	Prat de Cabanes-Torreblanca	Torreblanca	Castellón	
5Y86313	4	11/04/2025	Marjal de Nules	Nules	Castellón	
5Y66945	4	11/04/2025	Laguna de Pedraza	Pedraza de Campos	Palencia	
5Y66946	4	11/04/2025	Laguna de Pedraza	Pedraza de Campos	Palencia	
5Y66956	4	12/04/2025	Laguna de Pedraza	Pedraza de Campos	Palencia	
5Y66946	4	13/04/2025	Laguna de Pedraza	Pedraza de Campos	Palencia	recapture bird two days later

The **2Y52091** sample did not contain usable data; therefore, the analysis focused on the remaining five samples:

- **5Y86313** sample, Marjal de Nules, 11/04/2025: 37 prey species identified.
- **5Y66945** sample, Laguna de Pedraza, 11/04/2025: 1 prey species identified.
- **5Y66946** sample, Laguna de Pedraza,11/04/2025: 4 prey species identified.
- **5Y66956** sample, Laguna de Pedraza, 12/04/2025: 18 prey species identified.
- **5Y66946** sample (**recapture**), Laguna de Pedraza, 13/04/2025: 1 prey species identified.

In total, the analyses of these five samples revealed **79 matches corresponding to 63 taxa**. The raw results are presented in **Annex II**.

With regard to the thresholds for accepting an identification, the laboratory's recommended thresholds were applied:

- A match percentage **above 99%:** identification considered reliable.

➔ **This category includes majority of the matches, 58 out of 79 matches (73%).**

- **97 – 99% match :** genus or family-level identification considered reliable; species-level identification considered uncertain and therefore excluded.

➔ **4 matches concerned (IDs 26, 30, 33, 62).**

- **95 – 97% match:** genus-level identification likely unreliable; these were excluded.

➔ **6 matches concerned (IDs 21, 25, 38, 47, 48, 50).**

- A match **below 95%:** identification considered inaccurate; these prey items were removed entirely, as low percentages of homology can lead to substantial misidentification. The strictest possible strategy was therefore followed in order to achieve an optimal degree of identification.

➔ **18 matches concerned (IDs 3, 9, 18, 19, 20, 24, 32, 36, 39, 43, 45, 46, 52, 57, 58, 71, 73, 76).**

One prey item corresponded to an aquatic microorganism (*Rotifera*), likely ingested while drinking. This record was removed.

➔ **Concerned ID 20.**

Several identifications were considered artefactual: the taxa reported do not occur in Spain but belong to a genera or family that are well represented in the sampling areas. These cases likely reflect the absence of the prey species not sequenced or listed in the BOLD database,

leading the analysis to assign the closest available taxon. For these, the identification was retained only at the appropriate taxonomic level.

➔ **8 matches concerned (IDs 19, 22, 39, 48, 50, 58, 70, 76).**

Finally, the validated results were converted into **frequency of occurrence** values (**Table 2**).

Table 2: *Prey identified with a positive match (≥95%) from 5 faecal samples of the AW. Occurrence frequencies (OF, percentage of faecal samples containing the prey) are shown for each class, order and family.*

Class OF (%)	Order	OF (%)	Sub-Order	Family	OF (%)
Insecta 100%	**Diptera**	80%	**Nematocera** 60%	Culicidae	60%
				Chironomidae	40%
				Tipulidae	20%
			Brachycera 60%	Ephydridae	40%
				Calliphoridae	20%
				Dolichopodidae	20%
				Muscidae	20%
				Pipunculidae	20%
				Sciomyzidae	20%
				Pipunculidae	20%
				Scathophagidae	20%
				Syrphidae	20%
				Ulidiidae	20%
	Hemiptera	40%		Aphididae	20%
				Cicadellidae	20%
				Cixiidae	20%
				Rhopalidae	20%
	Hymenoptera	40%		Apidae	20%
				Braconidae	20%
				Formicidae	20%
	Coleoptera	40%		Carabidae	20%
				Chrysomelidae	20%
				Melyridae	20%
	Odonata	20%		Coenagrionidae	20%
	Lepidoptera	20%		Pyralidae	20%
	Trichoptera	20%		Limnephilidae	20%
Arachnida 40%	**Araneae**	40%		Lycosidae	40%
				Theridiidae	40%
				Tetragnathidae	20%
				Thomisidae	20%

Class OF (%)	Order	OF (%)	Sub-Order	Family	OF (%)
Malacostraca 20%	**Isopoda**	20%		Armadillidiidae	20%

4.2 Discussion

4.2.1 Comparison with French metabarcoding 2024 results

Of the 63 taxa identified across the five faecal samples, 14 were also recorded in France in 2024:

- *Aedes dorsalis* (Meigen, 1830)
- *Bombus jonellus* (Kirby, 1802)
- *Ceroxys urticae* (Linnaeus, 1758)
- *Chironomus pseudothummi* Strenzke, 1959
- *Dolichopus diadema* Haliday, 1832
- *Episyrphus balteatus* (De Geer, 1776)
- *Formica rufibarbis* Fabricius, 1793
- *Hyalopterus pruni* (Geoffroy, 1762)
- *Ischnura elegans* (Vander Linden, 1820)
- *Panimerus goetghebueri* (Tonnoir, 1919)
- *Paradromius linearis* (Olivier, 1795)
- *Paralimnus phragmitis* (Boheman, 1847)
- *Sepsis thoracica* (Robineau-Desvoidy, 1830)
- *Tetragnatha extensa* (Linnaeus, 1758)

4.2.2 Conclusions of the analysis

The dataset is too limited to support strong conclusions. However, the general pattern mirrors that observed in France, with a clear predominance of *Diptera*, *Hemiptera* and *Arachnida* in the AW diet.

Within *Diptera*, *Nematocera* (aquatic larvae) are as frequent as *Brachycera* (terrestrial larvae), although the latter group is considerably more diverse.

4.2.3 Limitation linked to the analysis of parasitoids

Among the *Hymenoptera*, two matches correspond to one species of *Braconidae*, a family of microhymenopteran parasitoids. This illustrates a known limitation of DNA-based diet analysis: it is impossible to determine whether these wasps were consumed intentionally as adults or ingested accidentally as larvae within their host prey.

➔ **2 matches concerned (IDs 31, 79).**

4.2.4 Prey consumption information to be interpreted with caution

The consumption categories assigned to each prey item (e.g., “in flight”, “on the ground”) and

presented in **Annex II** are general indications and should be interpreted with caution.

For example:

- Ants are listed as consumed both “in flight” and “on the ground”. However, flight consumption is only possible during brief swarming periods, which vary by species and depend on the weather conditions (cumulative temperatures, humidity, etc.).
- *Diptera Nematocera* (*Chironomidae*, mosquitoes, etc.) are indicated as eaten “in flight”, although this is not always the case.
- *Diptera Brachycera* may be consumed “in flight” or while resting “on the stem” or “in the inflorescence”, yet some species rest exclusively on wet mud near water. Accurately interpreting these behaviours require verifying the exact biology of each species and access to a comprehensive reference library.

4.2.5 New Diptera species in Spain

The results appear to confirm the presence in Spain of a species not previously recorded there: *Aedes dorsalis* (Meigen, 1830) (Diptera: Culicidae), also known as *Ochlerotatus dorsalis* (Bueno-Marí et al., 2012, read note 7, p.95).

5. Autumn migration

5.1 Results

Nine AW faecal samples were collected during autumn migration in Spain in 2025, at five distinct wetlands: Laguna de la Nava, Laguna de Boada, Ria de Urdaibai (Carrizal de Forua), Ria de Villaviciosa (Carrizal de Sebrayo), and Parque Nacional de Doñana (**Figure 3**; **Table 3**).

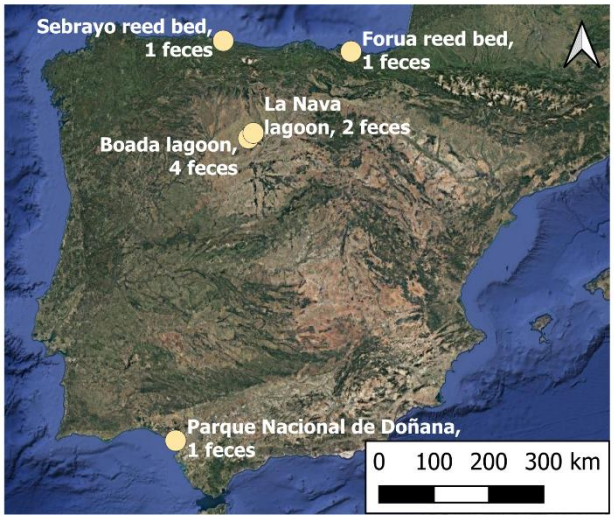

Figure 3: *Spanish wetlands where faecal samples were collected during autumn migration.*

Table 3: *Information concerning the nine faecal samples collected during autumn migration in Spain.*

Ring code	Age	Date	Site (wetland name)	Locality	Province	Observations
6Y06678	4	22/07/2025	Laguna de la Nava	Fuentes de Nava	Palencia	
6Y06823	4	23/07/2025	Laguna de Boada	Boada de Campos	Palencia	
6Y30288	4	05/08/2025	Laguna de la Nava	Fuentes de Nava	Palencia	
6Y30370	4	06/08/2025	Laguna de Boada	Boada de Campos	Palencia	
6Y30437	4	08/08/2025	Laguna de Boada	Boada de Campos	Palencia	
6Y06003	4	22/08/2025	Ría de Urdaibai. Carrizal de Forua	Forua	Bizkaia	
5Y66777	4	23/08/2025	Laguna de Boada	Boada de Campos	Palencia	
6Y12371	3	28/09/2025	Ría de Villaviciosa. Carrizal de Sebrayo	Villaverde	Asturias	
5Y99014	3	12/08/2025	Parque Nacional de Doñana	Matalascañas	Huelva	

The samples **6Y06678, 6Y30288** and **6Y06003** did not contain usable data. In addition, the only match obtained for sample **6Y30437** corresponded to a parasitic acarian; this sample was therefore excluded from the final dataset. The analysis focused on the remaining five samples:

- **5Y99014** sample, Parque Nacional de Doñana, 12/08/2025: 7 prey species identified.
- **6Y06003** sample, Ría de Urdaibai, Carrizal de Forua, 22/08/2025: 1 prey species identified.
- **6Y06823** sample, Laguna de Boada, 23/07/2025: 9 prey species identified.
- **6Y12371** sample, Ría de Villaviciosa, Carrizal de Sebrayo, 28/09/2025: 9 prey species identified.
- **6Y30370** sample, Laguna de Boada, 06/08/2025: 6 prey species identified.

In total, the analyses of these five samples revealed 33 matches corresponding to 21 taxa. The raw results are presented in **Annex III**.

With regard to the thresholds for accepting an identification, the laboratory's recommended thresholds were applied:

- A match percentage **above 99%:** identification considered reliable.

➔ **This category includes majority of the matches, 29 out of 33 matches (88%).**

- **97 – 99%:** genus or family-level identification considered reliable; species-level identification considered uncertain and therefore excluded.

➔ **No matches concerned.**

- **95 – 97%:** genus-level identification likely unreliable; these were excluded.

➔ **2 matches concerned (IDs 1, 6).**

- A match **below 95%:** identification considered inaccurate; these prey items were removed entirely, as low percentage of homology can lead to substantial misidentification. The strictest possible strategy was therefore followed in order to achieve an optimal degree of identification.

➔ **1 match concerned (ID 8).**

One prey item corresponded to a parasitic Acari (*Sarcoptiformes*), likely ingested while the bird consumed an insect. This record was removed.

➔ **1 match concerned (ID 33).**

Two identifications were considered artefactual: the taxa reported do not occur in Spain but belong to a genera or family that are well represented in the sampling areas. These cases likely reflect the absence of the prey species not sequenced or listed in the BOLD database, leading to the analysis to assign to the closest available taxon. For these, the identification was retained only at the appropriate taxonomic level.

➔ **2 matches concerned (IDs 5, 9).**

Finally, the validated results were converted into **frequency of occurrence** values (**Table 4**).

Table 4: *Prey identified with a positive match (≥95%) from 5 faecal samples of the AW. Occurrence frequencies (OF, percentage of faecal samples containing the prey) are shown for each class, order and family.*

Class OF (%)	Order	OF (%)	Sub-Order	Family	OF (%)
Insecta 100%	**Diptera**	60%	**Nematocera** 40%	Chironomidae	40%
				Cecidomyiidae	20%
			Brachycera 40%	Conopodidae	20%
				Dolichopodidae	20%
	Hemiptera	40%		Cicadellidae	40%
				Pentatomidae	20%
	Lepidoptera	40%		Erebidae	20%
				Geometridae	20%
	Coleoptera	20%		Curculionidae	20%
	Odonata	20%		Coenagrionidae	20%
	Orthoptera	20%		Tettigoniidae	20%
	Psocodea	20%		Elipsocidae	20%
	Thysanoptera	20%		Thripidae	20%
Arachnida 60%	**Araneae**	60%		Araneidae	40%
				Tetragnathidae	20%
Chilopoda 20%	**Lithobiomorpha**	20%		Henicopidae	20%

5.2 Discussion

5.2.1 Comparison with French metabarcoding 2024 results

Of the 21 taxa identified across the five faecal samples, 7 were also recorded in France in 2024:

- *Argiope bruennichi* (Scopoli, 1772)
- *Cicadella viridis* (Linnaeus, 1758)
- *Conocephalus fuscus* (Fabricius, 1793)
- *Ischnura elegans* (Vander Linden, 1820) (also eaten in post-nuptial)
- *Mangora acalypha* (Walckenaer, 1802)
- *Mycodiplosis coniophaga* (Winnertz, 1853)
- *Sitona lineatus* (Linnaeus, 1758)

5.2.2 Opportunities for improvement in future sampling

For the sampling campaigns planned in 2026 and 2027, several improvements can be considered. First, it is essential to use undenatured laboratory-grade ethanol, rather than commercial ethanol, in order to preserve the integrity of the samples. Commercial ethanol is typically denatured with additives that degrade DNA. Regarding concentration, 96% ethanol is the recommended minimum, although higher concentrations may also be used. Because faecal samples are often very moist, the water they contain dilutes the ethanol in the tube; using ethanol below 96% would therefore reduce DNA preservation due to this dilution.

To optimize analytical quality, only the solid portion of the faeces should be collected. The white liquid fraction consists mainly of urea, which is not relevant for metabarcoding analysis.

Lastly, storage conditions are also critical for maintaining sample quality. As indicated in the collection protocol, samples should be kept cool and protected from light. Freezing the samples further helps preserve DNA, however, freezing must be managed carefully, particularly when samples are collected at multiple sites and stored before being shipped together. It may be tempting to freeze samples at each site, allow them to thaw during transport to a central point, refreeze them, and then ship collectively – this should be avoided. Samples must not undergo repeated freeze-thaw cycles as this can significantly degrade DNA quality.

6. Conclusion

The analysis of AW faeces provided more information about the species' diet on the Iberian Peninsula. Out of the 15 faecal samples collected and submitted for analysis, 10 yielded usable results, each producing a set of matches with arthropod taxa. Among the remaining samples, four contained no exploitable DNA, likely due to degradation within the tubes. It is also possible that some samples lacked prey DNA because AW foraging often occurs very early in the morning, leaving insufficient time for feeding and subsequent defecation. In one additional sample, the only match corresponded to a parasitic acarian, which was not relevant for dietary assessment.

Although the analysis improved our understanding of AW diet in the region, the limited number of samples prevents drawing firm conclusions regarding prey selection or preferences. Only general trends can be identified. During **spring migration**, the most frequently occurring groups were *Diptera* (80%), *Hemiptera* (40%), spiders (40%), *Hymenoptera* (40%) and *Coleoptera* (40%). During **autumn migration**, the dominant groups were *Diptera* (80%), *Hemiptera* (40%), spiders (40%) and *Lepidoptera* (40%). Overall, this composition is consistent with previous French and Spanish studies, which also highlighted a strong representation of *Diptera*, *Hemiptera* and spiders. Nevertheless, these results must be interpreted with caution due to the small sample size.

Despite these limitations, the findings will contribute, together with previous studies, to identifying the most appropriate entomological protocol(s) for assessing food availability at stopover and wintering sites. To refine these results and expand current knowledge, additional faecal sampling and analysis will be carried out in Spain in 2026 and potentially 2027, with possible extension to Portugal and Senegal. The outcomes of these future analyses will be incorporated into this report at the end of each year in which new samples are collected and processed.

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Annexes

Annex I: Recommendations on interpreting results according to the laboratory

The laboratory used the CO1 marker, which allows DNA sequences of 133 base pairs to be extracted for the animal kingdom.

They then compared the sequences obtained with the BOLD database, which includes chordate and non-chordate species.

The two tables contain different columns:

1) sample name
2) sequence number for the sample
3) number of reads assigned to the sequence
4) sequence identification
6) sequence size compared to the database sequence (in percent) (= match distance)
7) percentage of bases in common between the sequence and the database sequence
8) sequence obtained

Interpreting the results is not an exact science. The thresholds that the laboratory proposes to use are arbitrary and may vary from one marker to another and from one run to another.

They only kept sequences with a match distance greater than 80% and a match greater than 90% in this file. Below this threshold, the proposed identification is not sufficiently relevant.

With regard to the thresholds for accepting an identification, they recommend the following protocol: above 99% match: we can be relatively confident about the proposed identification. Between 97 and 99%: we can trust the identification of the genus or family, but it would be risky to retain the identification down to the species level. Between 95 and 97%: the proposed genus and/or family is likely to be inaccurate.

For each sequence, there may be several proposed identifications, on the same line or on several lines (thus sharing the same sequence number and the same number of reads). This is a choice made in the bioinformatics script, which allows us to realise that several closely related species sometimes share the same sequence. In these cases, it is not possible to identify the sequence down to the species level. We must therefore choose the taxonomic level common to the different proposed identifications. This may be the genus, family or even order.

Finally, the higher the number of reads, the more likely it is that the presence of the identified species is genuine rather than a PCR artefact or external contamination.

For CO1, they obtain good identifications despite very low read counts (less than 100 reads). However, identifications characterised by fewer than 50 reads should be interpreted with great caution.

Annex II : Raw results for spring migration

ID	Sample name	sequence-nu	read-count	%age-of-filte	Selected taxa	Phylum	Class	Order	Sub-order	Family	Genus	Species	matchdist%	match%
1	MiquelezSY66946-recapture	2	11	0.0856831	Episyrphus balteatus	Arthropoda	Insecta	Diptera	Brachycera	Syrphidae	Episyrphus	Episyrphus balteatus (De Geer, 1776)	100	100
2	MiquelezSY66945	17	8	0.0013073 9	Paradromius linearis	Arthropoda	Insecta	Coleoptera		Carabidae	Paradromius	Paradromius linearis (Olivier, 1795)	100	99.2
3	MiquelezSY66946	5	34	0.817111	Sepsis thoracica	Arthropoda	Insecta	Diptera	Brachycera	Sepsidae	Sepsis	Sepsis thoracica (Robineau-Desvoidy, 1830)	98	98.9
4	MiquelezSY66946	10	30	0.720981	Aedes refiki	Arthropoda	Insecta	Diptera	Nematocera	Culicidae	Aedes	Aedes refiki Medschid, 1928	100	99.2
5	MiquelezSY66946	10	30	0.720981	Aedes refiki	Arthropoda	Insecta	Diptera	Nematocera	Culicidae	Aedes	Aedes refiki Medschid, 1928	100	99.2
6	MiquelezSY66946	6	29	0.696948	Aedes sp.	Arthropoda	Insecta	Diptera	Nematocera	Culicidae	Aedes		100	100
7	MiquelezSY66946	13	12	0.288392	Plodia interpunctella	Arthropoda	Insecta	Lepidoptera		Pyralidae	Plodia	Plodia interpunctella (Hübner, 1813)	100	100
8	MiquelezSY66956	21	24	0.017714 7	Gargaphia opacula	Arthropoda	Insecta	Hemiptera		Tingidae			99	90.9
9	MiquelezSY66956	19	25	0.0184528	Pyomarrhopalites principalis	Arthropoda	Entognatha	Collembola		Arthropalitidae	Pyomarrhopalites	Pyomarrhopalites principalis (J.Stach, 1945)	97	98.3
10	MiquelezSY66956	5	454	0.335102	Sepsis thoracica	Arthropoda	Insecta	Diptera	Brachycera	Sepsidae	Sepsis	Sepsis thoracica (Robineau-Desvoidy, 1830)	98	98.9
11	MiquelezSY66956	22	22	0.0162384	Philodina plena	Rotifera	Eurotatoria	Bdelloidea			Philodina	Philodina plena (Bryce, 1894)	99	94.7
12	MiquelezSY66956	27	16	0.0118098	Bombus ronellus	Arthropoda	Insecta	Hymenoptera		Apidae	Bombus	Bombus ronellus (Kirby, 1802)	97	94.8
13	MiquelezSY66956	23	22	0.0162384	Cassida sp.	Arthropoda	Insecta	Coleoptera		Chrysomelidae	Cassida		100	95.5
14	MiquelezSY66956	29	14	0.0103336	Anthomalachius spinosus	Arthropoda	Insecta	Coleoptera		Melyridae	Anthomalachius	Anthomalachius spinosus (Erichson, 1840)	98	96.2
15	MiquelezSY66956	39	6	0.0044286 7	Bombus ronellus	Arthropoda	Insecta	Hymenoptera		Apidae	Bombus	Bombus ronellus (Kirby, 1802)	96	97
16	MiquelezSY66956	33	10	0.0073811 1	Culiseta fumipennis	Arthropoda	Insecta	Diptera	Nematocera	Culicidae	Culiseta	Culiseta fumipennis (Stephens, 1825)	100	98.5
17	MiquelezSY66956	7	337	0.2487 43	Enoplognatha mordax	Arthropoda	Arachnida	Araneae		Theridiidae	Enoplognatha	Enoplognatha mordax (Thorell, 1875)	100	99.2
18	MiquelezSY66956	8	122	0.0900495	Culiseta fumipennis	Arthropoda	Insecta	Diptera	Nematocera	Culicidae	Culiseta	Culiseta fumipennis (Stephens, 1825)	100	99.2
19	MiquelezSY66956	11	49	0.0361674	Pardosa blanda	Arthropoda	Arachnida	Araneae		Lycosidae	Pardosa		100	99.2
20	MiquelezSY66956	37	6	0.0044286 7	Culiseta fumipennis	Arthropoda	Insecta	Diptera	Nematocera	Culicidae	Culiseta	Culiseta fumipennis (Stephens, 1825)	100	99.2
21	MiquelezSY66956	2	27598	2.03657	Arctosa fulvolineata	Arthropoda	Arachnida	Araneae		Lycosidae	Arctosa	Arctosa fulvolineata (Lucas, 1845)	100	100
22	MiquelezSY66956	6	249	0.183791	Tetragnatha extensa	Arthropoda	Arachnida	Araneae		Tetragnathidae	Tetragnatha	Tetragnatha extensa (Linnaeus, 1758)	97	100
23	MiquelezSY66956	10	53	0.0391199	Psectrocladius platypus	Arthropoda	Insecta	Diptera	Nematocera	Chironomidae	Psectrocladius		100	100
24	MiquelezSY66956	12	48	0.0354293	Aedes refiki	Arthropoda	Insecta	Diptera	Nematocera	Culicidae	Aedes	Aedes refiki Medschid, 1928	100	100
25	MiquelezSY66956	13	48	0.0354293	Tetragnatha extensa	Arthropoda	Arachnida	Araneae		Tetragnathidae	Tetragnatha	Tetragnatha extensa (Linnaeus, 1758)	100	100
26	MiquelezSY66956	15	39	0.0287863	Limotettix striola	Arthropoda	Insecta	Hemiptera		Cicadellidae	Limotettix	Limotettix striola (Fallén, 1806)	99	100
27	MiquelezSY66956	25	19	0.0140241	Hydrellia caledonica	Arthropoda	Insecta	Diptera	Brachycera	Ephydridae	Hydrellia		98	100
28	MiquelezSY66956	26	17	0.0125479	Arctosa fulvolineata	Arthropoda	Arachnida	Araneae		Lycosidae	Arctosa	Arctosa fulvolineata (Lucas, 1845)	100	100
29	MiquelezSY66956	35	10	0.0073811 1	Limnephilus affinis	Arthropoda	Insecta	Trichoptera		Limnephilidae	Limnephilus	Limnephilus affinis Curtis, 1834	100	100
30	MiquelezSY66956	38	6	0.0044286 7	Tetragnatha extensa	Arthropoda	Arachnida	Araneae		Tetragnathidae	Tetragnatha	Tetragnatha extensa (Linnaeus, 1758)	100	100
31	MiquelezSY86813	12	273	0.0549601	Bostaera bailli	Arthropoda	Insecta	Hemiptera		Delphacidae			98	90.8
32	MiquelezSY86813	31	74	0.0148976	Argenna subnigra	Arthropoda	Arachnida	Araneae		Dictynidae	Argenna	Argenna subnigra (O. Pickard-Cambridge, 1861)	98	91.5
33	MiquelezSY86813	36	35	0.0070451 7	Boletina hedstroemi	Arthropoda	Insecta	Diptera	Nematocera	Mycetophilidae	Boletina		96	92.2
34	MiquelezSY86813	35	46	0.0092606 8	Culicoides maritimus	Arthropoda	Insecta	Diptera	Nematocera	Ceratopogonidae	Culicoides	Culicoides maritimus Kieffer, 1924	100	92.5
35	MiquelezSY86813	3	1536	0.309226	Telmatoscopus advena	Arthropoda	Insecta	Diptera	Nematocera	Psychodidae	Telmatoscopus		100	98.2
36	MiquelezSY86813	16	214	0.0480823	Orthotylus rubidus	Arthropoda	Insecta	Hemiptera		Miridae	Orthotylus	Orthotylus rubidus (Puton, 1874)	99	98.2
37	MiquelezSY86813	20	175	0.0352308	Paralimnus phragmitis	Arthropoda	Insecta	Hemiptera		Cicadellidae	Paralimnus	Paralimnus phragmitis (Boheman, 1847)	100	98.2
38	MiquelezSY86813	21	172	0.0346269	Parajungiella pseudolongicornis	Arthropoda	Insecta	Diptera	Nematocera	Psychodidae	Parajungiella	Parajungiella pseudolongicornis Wagner, 1975	99	98.2
39	MiquelezSY86813	56	10	0.0020131 9	Panimerus goetghebueri	Arthropoda	Insecta	Diptera	Nematocera	Psychodidae	Panimerus	Panimerus goetghebueri (Tonnoir, 1919)	98	98.8
40	MiquelezSY86813	60	9	0.0018118 7	Cosmotettix unica	Arthropoda	Insecta	Hemiptera		Cicadellidae			100	94
41	MiquelezSY86813	54	11	0.0022145 1	Tricyclea fasciata	Arthropoda	Insecta	Diptera	Brachycera	Calliphoridae			95	94.4
42	MiquelezSY86813	7	502	0.101062	Singa nitidula	Arthropoda	Arachnida	Araneae		Araneidae	Singa	Singa nitidula C. L. Koch, 1844	100	94.7
43	MiquelezSY86813	22	170	0.0342242	Calliphoridae	Arthropoda	Insecta	Diptera	Brachycera	Calliphoridae			99	95.5
44	MiquelezSY86813	10	411	0.0827421	Ceroxys urticae	Arthropoda	Insecta	Diptera	Brachycera	Ulidiidae	Ceroxys	Ceroxys urticae (Linnaeus, 1758)	100	96.2
45	MiquelezSY86813	26	149	0.0299965	Dolichopus remipes	Arthropoda	Insecta	Diptera	Brachycera	Dolichopodidae	Dolichopus		100	96.2
46	MiquelezSY86813	24	166	0.033419	Hemiox rhinochaeta unicolor	Arthropoda	Insecta	Diptera	Brachycera	Calliphoridae			95	96.8
47	MiquelezSY86813	40	30	0.0060395 7	Enoplognatha mordax	Arthropoda	Arachnida	Araneae		Theridiidae	Enoplognatha	Enoplognatha mordax (Thorell, 1875)	100	97
48	MiquelezSY86813	4	674	0.135689	Pardosa sp.	Arthropoda	Arachnida	Araneae		Lycosidae	Pardosa		100	97.7
49	MiquelezSY86813	17	202	0.0406664	Pherbellia cinerella	Arthropoda	Insecta	Diptera	Brachycera	Sciomyzidae	Pherbellia	Pherbellia cinerella (Fallén, 1820)	100	99.2
50	MiquelezSY86813	25	158	0.0318084	Scatella lutosa	Arthropoda	Insecta	Diptera	Brachycera	Ephydridae	Scatella		100	99.2
51	MiquelezSY86813	34	50	0.010066	Armadillidium assimile	Arthropoda	Malacostraca	Isopoda		Armadillidiidae	Armadillidium	Armadillidium assimile Budde-Lund, 1885	98	99.2
52	MiquelezSY86813	39	30	0.0060395 7	Coniosternum decipiens	Arthropoda	Insecta	Diptera	Brachycera	Scathophagidae	Coniosternum	Coniosternum decipiens (Haliday, 1832)	100	99.2
53	MiquelezSY86813	46	19	0.0038250 6	Eudorylas ruralis	Arthropoda	Insecta	Diptera	Brachycera	Pipunculidae	Eudorylas	Eudorylas ruralis (Meigen, 1824)	100	99.2
54	MiquelezSY86813	51	15	0.0030197 9	Ozyptila furcula	Arthropoda	Arachnida	Araneae		Thomisidae	Ozyptila	Ozyptila furcula L. Koch, 1882	99	99.2
55	MiquelezSY86813	62	6	0.0012079 1	Armadillidium assimile	Arthropoda	Malacostraca	Isopoda		Armadillidiidae	Armadillidium	Armadillidium assimile Budde-Lund, 1885	98	99.2
56	MiquelezSY86813	2	1878	0.378077	Aphidius transcaspicus	Arthropoda	Insecta	Hymenoptera		Braconidae	Aphidius	Aphidius transcaspicus Telenga, 1958	100	100
57	MiquelezSY86813	6	560	0.1127399	Ischnura elegans	Arthropoda	Insecta	Odonata		Coenagrionidae	Ischnura	Ischnura elegans (Vander Linden, 1820)	100	100
58	MiquelezSY86813	6	560	0.1127399	Ischnura elegans	Arthropoda	Insecta	Odonata		Coenagrionidae	Ischnura	Ischnura elegans (Vander Linden, 1820)	100	100
59	MiquelezSY86813	9	467	0.0940166	Cricotopus bicinctus	Arthropoda	Insecta	Diptera	Nematocera	Chironomidae	Cricotopus	Cricotopus bicinctus (Meigen, 1818)	100	100
60	MiquelezSY86813	13	254	0.0511355	Dolichopus sabinus	Arthropoda	Insecta	Diptera	Brachycera	Dolichopodidae	Dolichopus	Dolichopus sabinus Haliday, 1838	100	100
61	MiquelezSY86813	14	236	0.0475113	Tipula sp.	Arthropoda	Insecta	Diptera	Nematocera	Tipulidae	Tipula		100	100
62	MiquelezSY86813	15	221	0.0444915	Pentastiridius leporinus	Arthropoda	Insecta	Hemiptera		Cixiidae	Pentastiridius	Pentastiridius leporinus (Linnaeus, 1761)	100	100
63	MiquelezSY86813	28	229	0.0461021	Dolichopus diadema	Arthropoda	Insecta	Diptera	Brachycera	Dolichopodidae	Dolichopus	Dolichopus diadema Haliday, 1832	100	100
64	MiquelezSY86813	32	72	0.014495	Chironomus riparius	Arthropoda	Insecta	Diptera	Nematocera	Chironomidae	Chironomus	Chironomus riparius Meigen, 1804	100	100
65	MiquelezSY86813	32	72	0.014495	Chironomus pseudothummi	Arthropoda	Insecta	Diptera	Nematocera	Chironomidae	Chironomus	Chironomus pseudothummi Strenzke, 1959	100	100
66	MiquelezSY86813	33	71	0.0142987	Enoplognatha mordax	Arthropoda	Arachnida	Araneae		Theridiidae	Enoplognatha	Enoplognatha mordax (Thorell, 1875)	100	100
67	MiquelezSY86813	37	32	0.0064422 1	Formica rufibarbis	Arthropoda	Insecta	Hymenoptera		Formicidae	Formica	Formica rufibarbis Fabricius, 1793	99	100
68	MiquelezSY86813	38	53	0.0106699	Aedes dorsalis	Arthropoda	Insecta	Diptera	Nematocera	Culicidae	Aedes	Aedes dorsalis (Meigen, 1830)	100	100
69	MiquelezSY86813	42	28	0.0056369 3	Messor barbarus	Arthropoda	Insecta	Hymenoptera		Formicidae	Messor	Messor barbarus (Linnaeus, 1767)	100	100
70	MiquelezSY86813	45	19	0.0038250 6	Clanoneurum sp.	Arthropoda	Insecta	Diptera	Brachycera	Ephydridae	Clanoneurum		100	100
71	MiquelezSY86813	47	19	0.0038250 6	Arctosa fulvolineata	Arthropoda	Arachnida	Araneae		Lycosidae	Arctosa	Arctosa fulvolineata (Lucas, 1845)	100	100
72	MiquelezSY86813	48	17	0.0034242	Hyalopterus pruni	Arthropoda	Insecta	Hemiptera		Aphididae	Hyalopterus	Hyalopterus pruni (Geoffroy, 1762)	100	100
73	MiquelezSY86813	52	15	0.0030197 9	Liorhyssus hyalinus	Arthropoda	Insecta	Hemiptera		Rhopalidae	Liorhyssus	Liorhyssus hyalinus (Fabricius, 1794)	100	100
74	MiquelezSY86813	53	11	0.0022145 1	Lispocephala miki	Arthropoda	Insecta	Diptera	Brachycera	Muscidae	Lispocephala	Lispocephala mikii (Strobl, 1898)	100	100
75	MiquelezSY86813	55	10	0.0020131 9	Theridion melanostictum	Arthropoda	Arachnida	Araneae		Theridiidae	Theridion	Theridion melanostictum O. Pickard-Cambridge, 1876	100	100
76	MiquelezSY86813	58	9	0.0018118 7	Hyalopterus pruni	Arthropoda	Insecta	Hemiptera		Aphididae	Hyalopterus	Hyalopterus pruni (Geoffroy, 1762)	100	100
77	MiquelezSY86813	58	9	0.0018118 7	Hyalopterus amygdali	Arthropoda	Insecta	Hemiptera		Aphididae	Hyalopterus	Hyalopterus amygdali (Blanchard, 1840)	100	100
78	MiquelezSY86813	68	5	0.0010066	Chironomidae	Arthropoda	Insecta	Diptera	Nematocera	Chironomidae			100	100
79	MiquelezSY86813	65	5	0.0010066	Aphidius transcaspicus	Arthropoda	Insecta	Hymenoptera		Braconidae	Aphidius	Aphidius transcaspicus Telenga, 1958	92	100

ID	Sample name	sequence-nu	read count	% age-of-flite	Selected taxa	sequence	total-sample-	total-sample-	% age-of-raw-	Remarks	In flight	On the ground	On/in the water	On the stem	In the stem	In the inflorescence
1	MiquelezSY00946-recapture	2	11	0.00156831	Epicyphus balteatus	AACCTTATA	13948	12889	0.07386644							
2	MiquelezSY00945	17	8	0.00130739	Paradromius linearis	AACTTTATA	658084	611907	0.00121565		X			X		X
3	MiquelezSY00946	5	34	0.817111	Sepsis thoracica	AACATTATA	11242	4161	0.8309487		X			X		X
4	MiquelezSY00946	10	30	0.720981	Aedes refiki	AACATTATA	11242	4161	0.266856		X					
5	MiquelezSY00946	10	30	0.720981	Aedes refiki	AACATTATA	11242	4161	0.266856	Syn. Ochlerotatus refiki Medschid, 1928	X					
6	MiquelezSY00946	6	29	0.696948	Aedes sp.	TACATTATA	11242	4161	0.257961	Syn. Ochlerotatus refiki Medschid, 1928	X					
7	MiquelezSY00946	18	12	0.288392	Plodia interpunctella	AACTTTATA	11242	4161	0.10674		X			X		
8	MiquelezSY00956	21	24	0.017147	Garganthia occulta	AACTTTATA	145456	135481	0.0164938			X				
9	MiquelezSY00956	19	25	0.0184528	Pygmarmhopalites principalis	AACTTTATA	145456	135481	0.0171873		X			X		X
10	MiquelezSY00956	5	454	0.335102	Sepsis thoracica	AACATTATA	145456	135481	0.312122			X		X		X
11	MiquelezSY00956	22	22	0.0162384	Philodina plena	TACATTGTA	145456	135481	0.0151248			X		X		X
12	MiquelezSY00956	27	16	0.0118098	Bombus jonellus	AACTTTATA	145456	135481	0.0109999		X					
13	MiquelezSY00956	23	22	0.0162384	Cassidia sp.	AACATTATA	145456	135481	0.0151248		X					
14	MiquelezSY00956	29	14	0.0103836	Anthomalachus spinosus	AACTTTATA	145456	135481	0.0090249			X		X		X
15	MiquelezSY00956	39	6	0.0044287	Bombus jonellus	AACTTTATA	145456	135481	0.0041249	Syn. Ochlerotatus refiki Medschid, 1928	X					
16	MiquelezSY00956	33	10	0.0073811	Culiseta fumipennis	AACTTTATA	145456	135481	0.0068749			X		X		X
17	MiquelezSY00956	7	337	0.248748	Enoplognatha mordax	AACATTATA	145456	135481	0.231685		X			X		X
18	MiquelezSY00956	8	122	0.0900495	Culiseta fumipennis	AACTTTATA	145456	135481	0.0838742			X				
19	MiquelezSY00956	11	49	0.0361674	Pardosa blanda	AACTTTATA	145456	135481	0.0336872	Species native to North America, but the family is well represented in the sampling areas	X			X		X
20	MiquelezSY00956	37	6	0.0044287	Culiseta fumipennis	AACTTTATA	145456	135481	0.0041249	Aquatic microorganism			X			
21	MiquelezSY00956	2	27598	2.03667	Arctosa fulvolineata	GACTTTATA	145456	135481	18.97			X		X		
22	MiquelezSY00956	6	249	0.18379	Tetragnatha extensa	AAGTTTATA	145456	135481	0.171186	Species from Eastern Europe, but the genus is well represented in the sampling areas	X			X		X
23	MiquelezSY00956	10	58	0.0531199	Pseudocladius platypus	TACTTTATA	145456	135481	0.0564871			X				
24	MiquelezSY00956	12	48	0.0354298	Aedes refiki	AACATTATA	145456	135481	0.0329997		X			X		
25	MiquelezSY00956	18	48	0.0354298	Tetragnatha extensa	AAGTTTATA	145456	135481	0.0329997		X			X		X
26	MiquelezSY00956	15	39	0.0287863	Limoteitix stinola	AACTATATA	145456	135481	0.0268122		X					
27	MiquelezSY00956	25	19	0.0140241	Hydrella caledonica	AACATTATA	145456	135481	0.0130634		X			X		
28	MiquelezSY00956	26	17	0.0125479	Arctosa fulvolineata	GACTTTATA	145456	135481	0.0116874		X					
29	MiquelezSY00956	35	10	0.0073811	Limnephilus affinis	AACTATTTA	145456	135481	0.0068749			X		X		X
30	MiquelezSY00956	38	6	0.0044287	Tetragnatha extensa	AAGTTTATA	145456	135481	0.0041249		X			X		
31	MiquelezSY00813	12	273	0.0549601	Bostaera baltl	TTCACTTTA	531516	496724	0.0513625		X			X		
32	MiquelezSY00813	31	74	0.0148376	Argenna subnigra	AACATTATA	531516	496724	0.0139234		X					
33	MiquelezSY00813	36	35	0.0070417	Boletina hedstroemi	AACTTTATA	531516	496724	0.0065834			X		X		X
34	MiquelezSY00813	35	46	0.0092608	Culicoides marinus	AACTTTATA	531516	496724	0.0086449		X			X		
35	MiquelezSY00813	8	1536	0.309226	Telmatoscopus advena	AACTTTATA	531516	496724	0.288385		X			X		
36	MiquelezSY00813	16	214	0.0430823	Orthotylus rubidus	AACTTTATA	531516	496724	0.0402622			X		X		X
37	MiquelezSY00813	20	175	0.0352308	Paralimnus phragmitis	AACTTTGTA	531516	496724	0.0329247		X					
38	MiquelezSY00813	21	172	0.0346269	Parajungiella pseudolongicornis	AACTTTATA	531516	496724	0.0323605		X			X		X
39	MiquelezSY00813	50	10	0.0020131	Panimerus goetghebueri	AACTTTATA	531516	496724	0.0018814	Species native to North America, but the family is well represented in the sampling areas	X			X		X
40	MiquelezSY00813	60	9	0.0018117	Cosmotettix unica	AACTTTATA	531516	496724	0.0016927		X			X		X
41	MiquelezSY00813	54	11	0.0022145	Tricyclea fasciata	AACTCTTTA	531516	496724	0.0020695		X					
42	MiquelezSY00813	7	502	0.101062	Singa nitidula	TACTTTATA	531516	496724	0.0944468		X			X		X
43	MiquelezSY00813	22	170	0.0342342	Callichondae	AACTTTATA	531516	496724	0.0321384		X			X		X
44	MiquelezSY00813	10	411	0.0827421	Ceroxys urticae	TACCCTTTA	531516	496724	0.077326		X			X		X
45	MiquelezSY00813	24	149	0.0299965	Dolichopus remipes	AACTTTATA	531516	496724	0.0280583		X			X		X
46	MiquelezSY00813	24	166	0.0334419	Hemicyrmnochaeta unicolor	AACTCTTTA	531516	496724	0.0312514		X					
47	MiquelezSY00813	40	30	0.0060857	Enoplognatha mordax	AACATTATA	531516	496724	0.0056442		X			X		X
48	MiquelezSY00813	4	674	0.135683	Pardosa sp.	AACTTTATA	531516	496724	0.126807	Species from Africa, but the family is well represented in the sampling areas	X			X		X
49	MiquelezSY00813	17	202	0.0406664	Pherbellia cinerella	AACACTTTA	531516	496724	0.0380045		X			X		X
50	MiquelezSY00813	25	158	0.0318084	Scatella lutosa	AACCCTTTA	531516	496724	0.0297268	Holarctic species, but the genus is well represented in the sampling areas	X			X		X
51	MiquelezSY00813	34	50	0.010066	Armadillidium assimile	AACATTATA	531516	496724	0.0094005		X			X		X
52	MiquelezSY00813	39	30	0.0060857	Conocternum decipiens	TACATTATA	531516	496724	0.0056442			X		X		
53	MiquelezSY00813	44	19	0.0082506	Eudorylas ruralis	AACTTTATA	531516	496724	0.0077448		X					
54	MiquelezSY00813	51	15	0.0060197	Oxypoda furcula	GACTTTATA	531516	496724	0.0056221		X					
55	MiquelezSY00813	62	6	0.0012079	Armadillidium assimile	GACATTATA	531516	496724	0.0011285			X		X		X
56	MiquelezSY00813	2	1878	0.378077	Aphidius transcaspicus	AATTTTATA	531516	496724	0.353823			X				
57	MiquelezSY00813	6	560	0.112739	Ischnura elegans	AACCCTATA	531516	496724	0.105359		X					
58	MiquelezSY00813	6	560	0.112739	Ischnura elegans	AACCCTATA	531516	496724	0.105359	Species from Scandinavia, but the genus is well represented in the sampling areas. Polevoi (A.), Hedmark (K.), 2004. New species of the genus Boletina Winnertz (Diptera, Mycetophilidae) from Fennoscandia. Entomologica Fennica 15(1): 23-38.	X					
59	MiquelezSY00813	9	467	0.094014	Oncotopus brunctus	AACTTTATA	531516	496724	0.0878619		X	X				
60	MiquelezSY00813	18	254	0.051135	Dolichopus sabinus	AACTTTATA	531516	496724	0.0477873	Syn. Ochlerotatus dorsalis Meigen, 1830. Probably a new species for Spain. Bueno-Marí (R.) & Al., 2012. Updated checklist and distribution maps of mosquitoes (Diptera: Culicidae) of Spain. European Mosquito Bulletin 30: 91-126. See note 7.	X					
61	MiquelezSY00813	14	236	0.0475113	Tipula sp.	AACTTTATA	531516	496724	0.0444013		X			X		X
62	MiquelezSY00813	15	221	0.0444915	Pentastiridius leporinus	AACATTATA	531516	496724	0.0415792			X		X		X
63	MiquelezSY00813	23	229	0.0461021	Dolichopus diadema	AACTTTATA	531516	496724	0.0430848		X	X				
64	MiquelezSY00813	32	72	0.014495	Chironomus riparius	AACTTTATA	531516	496724	0.0135462		X			X		X
65	MiquelezSY00813	32	72	0.014495	Chironomus pseudothummi	AACTTTATA	531516	496724	0.0135462	Syn. Cladotanytarsus nubilus (Meigen, 1804)	X			X		X
66	MiquelezSY00813	33	71	0.0142937	Enoplognatha mordax	AACATTATA	531516	496724	0.013358			X				
67	MiquelezSY00813	37	32	0.0064421	Formica rufibarbis	TATTCTCTA	531516	496724	0.0060051		X			X		X
68	MiquelezSY00813	38	58	0.0106699	Aedes dorsalis	TACATTATA	531516	496724	0.0099748					X		X
69	MiquelezSY00813	42	28	0.0056398	Messor barbarus	TATCCTTTA	531516	496724	0.0052695		X			X		X
70	MiquelezSY00813	45	19	0.0082506	Clanoneurum sp.	TACTTTATA	531516	496724	0.0077448		X			X		X
71	MiquelezSY00813	47	19	0.0082506	Arctosa fulvolineata	GACTTTATA	531516	496724	0.0077448	Species from Africa, but the family is well represented in the sampling areas	X			X		X
72	MiquelezSY00813	48	17	0.0074237	Hyalopterus pruni	AACTTTATA	531516	496724	0.0069384			X		X		X
73	MiquelezSY00813	52	15	0.0060197	Liorhyssus hyalinus	AACTTTATA	531516	496724	0.0056221		X					
74	MiquelezSY00813	53	11	0.0047511	Lipocephala miki	AACATTATA	531516	496724	0.0044401		X			X		X
75	MiquelezSY00813	55	10	0.0040263	Thendon melanostictum	AACTTTATA	531516	496724	0.0037628		X			X		X
76	MiquelezSY00813	58	9	0.0038117	Hyalopterus pruni	AACTTTATA	531516	496724	0.0035627	Species native to North America, but the family is well represented in the sampling areas	X			X		X
77	MiquelezSY00813	59	9	0.0038117	Hyalopterus amygdali	AACTTTATA	531516	496724	0.0035627			X				
78	MiquelezSY00813	63	5	0.0021173	Chironomidae	AACTTTATA	531516	496724	0.0019793		X					
79	MiquelezSY00813	65	5	0.0021173	Aphidius transcaspicus	AATTTTATA	531516	496724	0.0019793		X			X		

Annex III : Raw results for autumn migration

ID	Sample-name	sequence-nu	read-count	% age-of-filter	Selected taxa	Phylum	Class	Order	Sub-order	Family	Genus	Species	matchdist%	match%
1	Miguelez-5Y 99014	7	39	0.197059	Mycodiplosis coniophaga	Arthropoda	Insecta	Diptera	Nematocera	Cecidomyiidae			97	96.1
2	Miguelez-5Y 99014	2	1989	10.05	Paramesus major	Arthropoda	Insecta	Hemiptera		Cicadellidae			98	96.2
3	Miguelez-5Y 99014	3	1121	5.66419	Conocephalus fuscus	Arthropoda	Insecta	Orthoptera		Tettigoniidae	Conocephalus	Conocephalus fuscus (Fabricius, 1793)	100	99.2
4	Miguelez-5Y 99014	3	1121	5.66419	Conocephalus fuscus	Arthropoda	Insecta	Orthoptera		Tettigoniidae	Conocephalus	Conocephalus fuscus (Fabricius, 1793)	100	99.2
5	Miguelez-5Y 99014	9	18	0.0909504	Scopula minorata	Arthropoda	Insecta	Lepidoptera		Geometridae	Scopula	Scopula minorata (Boisduval, 1833)	100	99.2
6	Miguelez-5Y 99014	4	82	0.41433	Tarytarsus formosanus	Arthropoda	Insecta	Diptera	Nematocera	Chironomidae	Tarytarsus		100	100
7	Miguelez-5Y 99014	5	59	0.298115	Tetragnatha nitens	Arthropoda	Arachnida	Araneae		Tetragnathidae	Tetragnatha	Tetragnatha nitens (Audouin, 1826)	100	100
8	Miguelez-6Y 06003	3	39	0.0539456	Stylogaster smithiana	Arthropoda	Insecta	Diptera	Brachycera	Conopidae			100	92.5
9	Miguelez-6Y 06823	9	35	0.0203159	Chironomus curabilis	Arthropoda	Insecta	Diptera	Nematocera	Chironomidae	Chironomus	ironus curabilis Belyanina, Sigareva & Loginova	100	99.2
10	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	Arthropoda	Insecta	Odonata		Coenagrionidae	Ischnura	Ischnura elegans (Vander Linden, 1820)	100	100
11	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	Arthropoda	Insecta	Odonata		Coenagrionidae	Ischnura	Ischnura elegans (Vander Linden, 1820)	100	100
12	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	Arthropoda	Insecta	Odonata		Coenagrionidae	Ischnura	Ischnura elegans (Vander Linden, 1820)	100	100
13	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	Arthropoda	Insecta	Odonata		Coenagrionidae	Ischnura	Ischnura elegans (Vander Linden, 1820)	100	100
14	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	Arthropoda	Insecta	Odonata		Coenagrionidae	Ischnura	Ischnura elegans (Vander Linden, 1820)	100	100
15	Miguelez-6Y 06823	17	8	0.00464363	Lamyctes africanus	Arthropoda	Chilopoda	Lithobiomorpha		Henicopidae	Lamyctes	Lamyctes africanus Poret, 1871	100	100
16	Miguelez-6Y 06823	18	7	0.00406318	Argiope bruennichi	Arthropoda	Arachnida	Araneae		Araneidae	Argiope	Argiope bruennichi (Scopoli, 1772)	100	100
17	Miguelez-6Y 06823	18	7	0.00406318	Argiope bruennichi	Arthropoda	Arachnida	Araneae		Araneidae	Argiope	Argiope bruennichi (Scopoli, 1772)	100	100
18	Miguelez-6Y12371	6	62	0.161804	Dolichopodidae	Arthropoda	Insecta	Diptera	Brachycera	Dolichopodidae			99	98.5
19	Miguelez-6Y12371	5	201	0.524558	Eysarcoris ventralis	Arthropoda	Insecta	Hemiptera		Pentatomidae	Eysarcoris	Eysarcoris ventralis (Westwood, 1837)	100	99.2
20	Miguelez-6Y12371	8	42	0.109609	Mangora acalypha	Arthropoda	Arachnida	Araneae		Araneidae	Mangora	Mangora acalypha (Walckenaer, 1802)	100	99.2
21	Miguelez-6Y12371	10	13	0.0339266	Thrips fuscipennis	Arthropoda	Insecta	Thysanoptera		Thripidae	Thrips	Thrips fuscipennis Haliday, 1836	100	99.3
22	Miguelez-6Y12371	2	902	2.35399	Cicadella viridis	Arthropoda	Insecta	Hemiptera		Cicadellidae	Cicadella	Cicadella viridis (Linnaeus, 1758)	100	100
23	Miguelez-6Y12371	2	902	2.35399	Cicadella viridis	Arthropoda	Insecta	Hemiptera		Cicadellidae	Cicadella	Cicadella viridis (Linnaeus, 1758)	100	100
24	Miguelez-6Y12371	2	902	2.35399	Cicadella viridis	Arthropoda	Insecta	Hemiptera		Cicadellidae	Cicadella	Cicadella viridis (Linnaeus, 1758)	100	100
25	Miguelez-6Y12371	13	8	0.0208779	Propsocus pulchripennis	Arthropoda	Insecta	Psocodea		Elipsocidae	Propsocus	Propsocus pulchripennis (Perkins, 1899)	100	100
26	Miguelez-6Y12371	13	8	0.0208779	Propsocus pulchripennis	Arthropoda	Insecta	Psocodea		Elipsocidae	Propsocus	Propsocus pulchripennis (Perkins, 1899)	100	100
27	Miguelez-6Y30370	4	608	0.488891	Sitona discoideus	Arthropoda	Insecta	Coleoptera		Curculionidae	Sitona	Sitona discoideus Gyllenhal, 1834	100	100
28	Miguelez-6Y30370	6	354	0.284651	Sitona lineatus	Arthropoda	Insecta	Coleoptera		Curculionidae	Sitona	Sitona lineatus (Linnaeus, 1758)	100	100
29	Miguelez-6Y30370	13	14	0.0112574	Lymantria dispar	Arthropoda	Insecta	Lepidoptera		Erebidae	Lymantria	Lymantria dispar Linnaeus, 1758	100	100
30	Miguelez-6Y30370	13	14	0.0112574	Lymantria dispar	Arthropoda	Insecta	Lepidoptera		Erebidae	Lymantria	Lymantria dispar Linnaeus, 1759	100	100
31	Miguelez-6Y30370	13	14	0.0112574	Lymantria dispar	Arthropoda	Insecta	Lepidoptera		Erebidae	Lymantria	Lymantria dispar Linnaeus, 1760	100	100
32	Miguelez-6Y30370	13	14	0.0112574	Lymantria dispar	Arthropoda	Insecta	Lepidoptera		Erebidae	Lymantria	Lymantria dispar Linnaeus, 1761	100	100
33	Miguelez-6Y30437	14	10	0.00748167	Trouessartia bifurcata	Arthropoda	Arachnida	Sarcoptiformes		Trouessartiidae	Trouessartia	Trouessartia bifurcata (Trouessart, 1885)	99	100

ID	Sample-name	sequence-nu	read-count	% age-of-filter	Selected taxa	sequence	total-sample-re	total-sample-filtered-r	% age-of-raw-r	Remarks	In flight	On the ground	On/in the water	On the stem	In the stem	In the inflorescence
1	Miguelez-5Y 99014	7	39	0.197059	Mycodiplosis coniophaga	AACTCTATATT	78566	72295	0.0496398		X			X		X
2	Miguelez-5Y 99014	2	1989	10.05	Paramesus major	AACTTTGTACT	27805	19791	0.140263			X		X		
3	Miguelez-5Y 99014	3	1121	5.66419	Conocephalus fuscus	AACCCTATACT	27805	19791	7.15389			X		X		
4	Miguelez-5Y 99014	3	1121	5.66419	Conocephalus fuscus	AACCCTATACT	43457	38318	0.14267	Species from Asia, but the genus is wellrepres	X					
5	Miguelez-5Y 99014	9	18	0.0909504	Scopula minorata	AACATTATATT	27805	19791	4.03165			X		X		X
6	Miguelez-5Y 99014	4	82	0.41433	Tarytarsus formosanus	AACATTATATT	27805	19791	4.03165	Syn. Mycodiplosis thoracica (Fitch, 1845)	X					
7	Miguelez-5Y 99014	5	59	0.298115	Tetragnatha nitens	GAGATTATATT	27805	19791	0.0647366							
8	Miguelez-6Y 06003	3	39	0.0539456	Stylogaster smithiana	AACACTGTACC	181007	172279	0.0193363	Species native to South America but familywel	X			X		X
9	Miguelez-6Y 06823	9	35	0.0203159	Chironomus curabilis	AACTCTCTACA	43457	38318	0.462526		X			X		
10	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	AACCCTATATT	43457	38318	0.0966473		X			X		
11	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	AACCCTATATT	43457	38318	0.0299146		X			X		
12	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	AACCCTATATT	27805	19791	0.294911		X			X		
13	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	AACCCTATATT	27805	19791	0.212192		X			X		
14	Miguelez-6Y 06823	4	174	0.100999	Ischnura elegans	AACCCTATATT	181007	172279	0.0961289		X					
15	Miguelez-6Y 06823	17	8	0.00464363	Lamyctes africanus	GACTATATATT	181007	172279	0.0961289			X				
16	Miguelez-6Y 06823	18	7	0.00406318	Argiope bruennichi	AACTTTATACT	181007	172279	0.0961289			X		X		X
17	Miguelez-6Y 06823	18	7	0.00406318	Argiope bruennichi	AACTTTATACT	181007	172279	0.0961289			X		X		X
18	Miguelez-6Y12371	6	62	0.161804	Dolichopodidae	AACTTTATACT	181007	172279	0.0961289		X			X		X
19	Miguelez-6Y12371	5	201	0.524558	Eysarcoris ventralis	AACTCTATACT	181007	172279	0.00441972		X			X		X
20	Miguelez-6Y12371	8	42	0.109609	Mangora acalypha	TACTTTATATTT	181007	172279	0.00386725		X			X		X
21	Miguelez-6Y12371	10	13	0.0339266	Thrips fuscipennis	TATCCTTTACT	181007	172279	0.00386725		X			X		X
22	Miguelez-6Y12371	2	902	2.35399	Cicadella viridis	TACAATGTACT	43457	38318	2.07561		X			X		X
23	Miguelez-6Y12371	2	902	2.35399	Cicadella viridis	TACAATGTACT	43457	38318	2.07561			X		X		X
24	Miguelez-6Y12371	2	902	2.35399	Cicadella viridis	TACAATGTACT	43457	38318	2.07561		X					X
25	Miguelez-6Y12371	13	8	0.0208779	Propsocus pulchripennis	GACCTTATACT	43457	38318	0.018409		X			X		X
26	Miguelez-6Y12371	13	8	0.0208779	Propsocus pulchripennis	GACCTTATACT	43457	38318	0.018409		X			X		X
27	Miguelez-6Y30370	4	608	0.488891	Sitona discoideus	AACACTTTATT	133535	124363	0.455311			X				
28	Miguelez-6Y30370	6	354	0.284651	Sitona lineatus	AACATTGTATT	133535	124363	0.265099			X				
29	Miguelez-6Y30370	13	14	0.0112574	Lymantria dispar	AACCTTATATT	133535	124363	0.0104841		X			X		
30	Miguelez-6Y30370	13	14	0.0112574	Lymantria dispar	AACCTTATATT	133535	124363	0.0104841		X			X		
31	Miguelez-6Y30370	13	14	0.0112574	Lymantria dispar	AACCTTATATT	133535	124363	0.0104841		X			X		
32	Miguelez-6Y30370	13	14	0.0112574	Lymantria dispar	AACCTTATATT	133535	124363	0.0104841		X			X		
33	Miguelez-6Y30437	14	10	0.00748167	Trouessartia bifurcata	CTACTCTTTAT	143677	133660	0.00696006	Parasitic Acari						