Foraging requirement and diet specificity of the Aquatic Warbler at autumn migration stopover

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- Séminaire restitution du programme Life -

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Mains goals of this study :

1. Identification of preys of the Aquatic Warbler

2. Relationship between Aquatic Warbler main preys and the habitat

3. Mass gain strategy in stopover

But, identify preys using faeces analysis is hindered by deferential digestibility among preys.

Alternatively, we chose to comparing in the same stopover areas (Audierne marshes) faeces of the Aquatic Warbler and 2 commoner congeners: Reed Warbler and Sedge Warbler, which enabled us to highlight diet specificity of the Aquatic warbler according to the hypothesis that digestibility bias is equal among these 3 species.

METHODS: Faecal collection





Espèce	bague	Date	Localité	Ordre	Famille	Genre	Espèce	Nombre
ACROLA	4042976	04/08/2001	Trunvel	Orthoptère	Tettigonidae	Conocephalus	discolor	1
ACROLA	4389973	13/08/2001	Trunvel	Diptère	Dolichopodidae			1
ACROLA	4530315	14/08/2001	Trunvel	Odonate		Ischnura	elegans	1
ACROLA	4530315	14/08/2001	Trunvel	Diptère	Dolichopodidae			1
ACROLA	4530315	14/08/2001	Trunvel	Diptère				2
ACROLA	4530377	15/08/2001	Trunvel	Diptère				1
ACROLA	4643350	13/08/2002	Trunvel	Diptère	Dolichopodidae			1
ACROLA	4643350	13/08/2002	Trunvel	Odonate		Ischnura	elegans	1
ACROLA	4643350	13/08/2002	Trunvel	Orthoptère	Tettigonidae	Conocephalus	discolor	1

Ringing information

Diet analysis information

METHODS: Faecal collection







		Aquatic Warbler	Sedge Warbler	Reed Warbler
2001	August	9	1	-
	September	-	1	-
2002	August	11	-	-
	September	12	-	-
2003	August	50	64	21
	September	11	3	2
2004	August	32	8	5
	September	3	1	-
Total		128	78	28

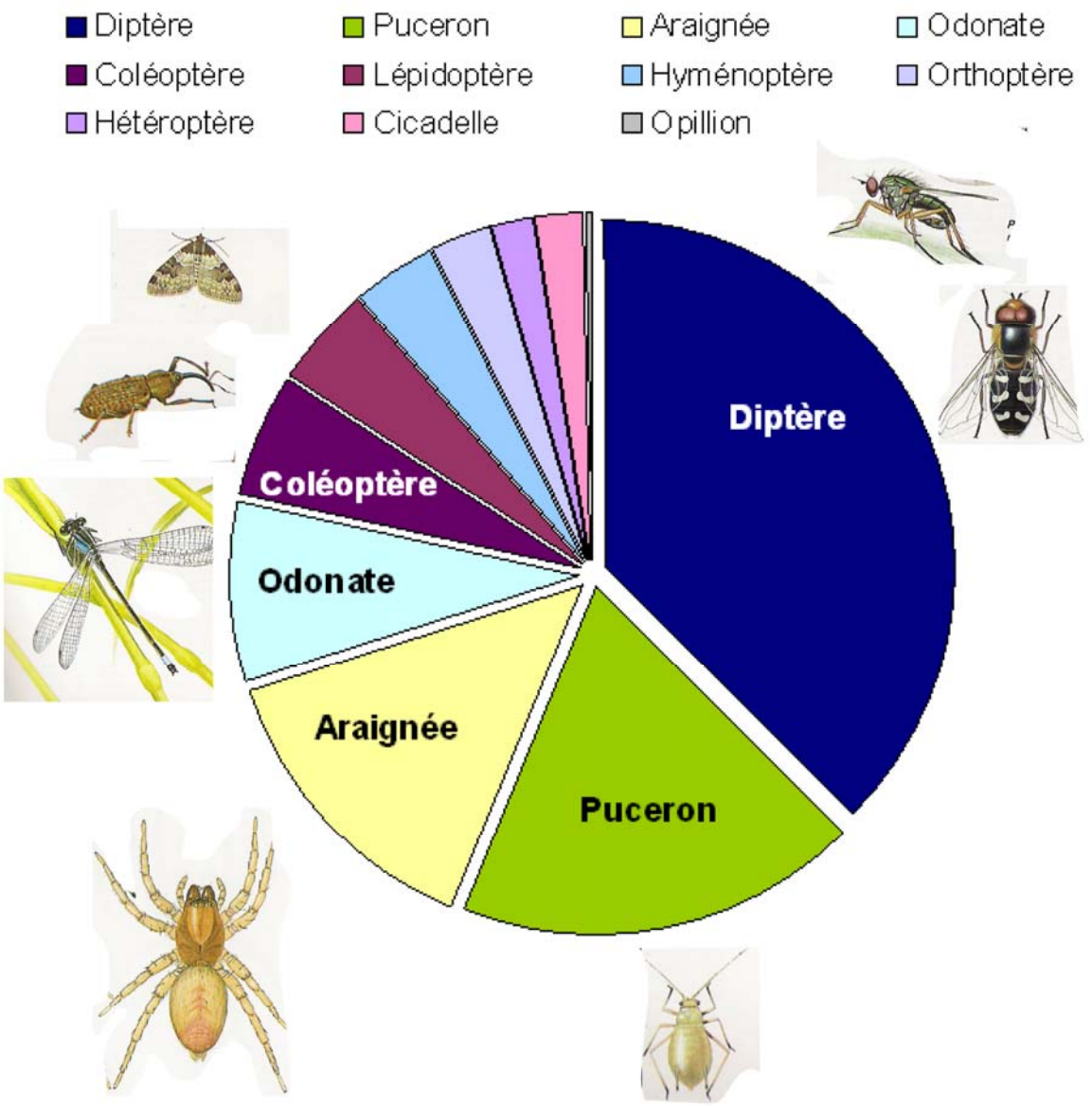
234 faeces

1731 preys

Aquatic Warbler diet

Abundance

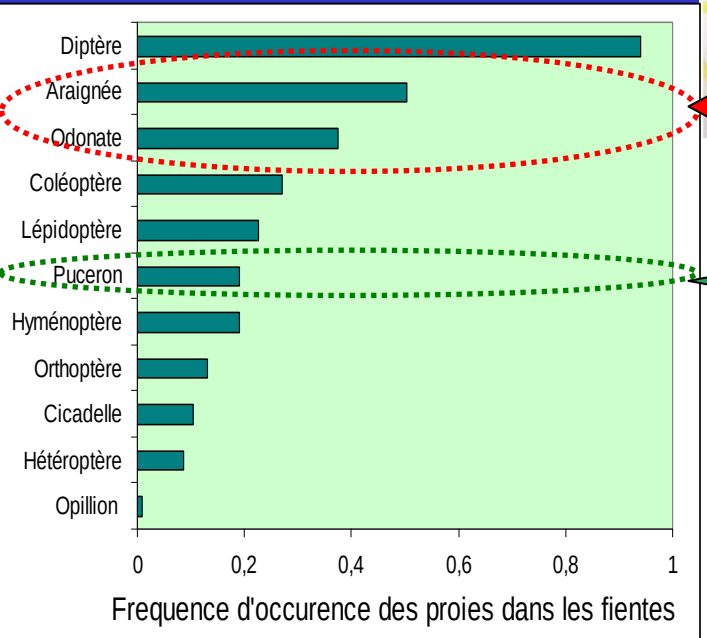
128 faeces 571 preys



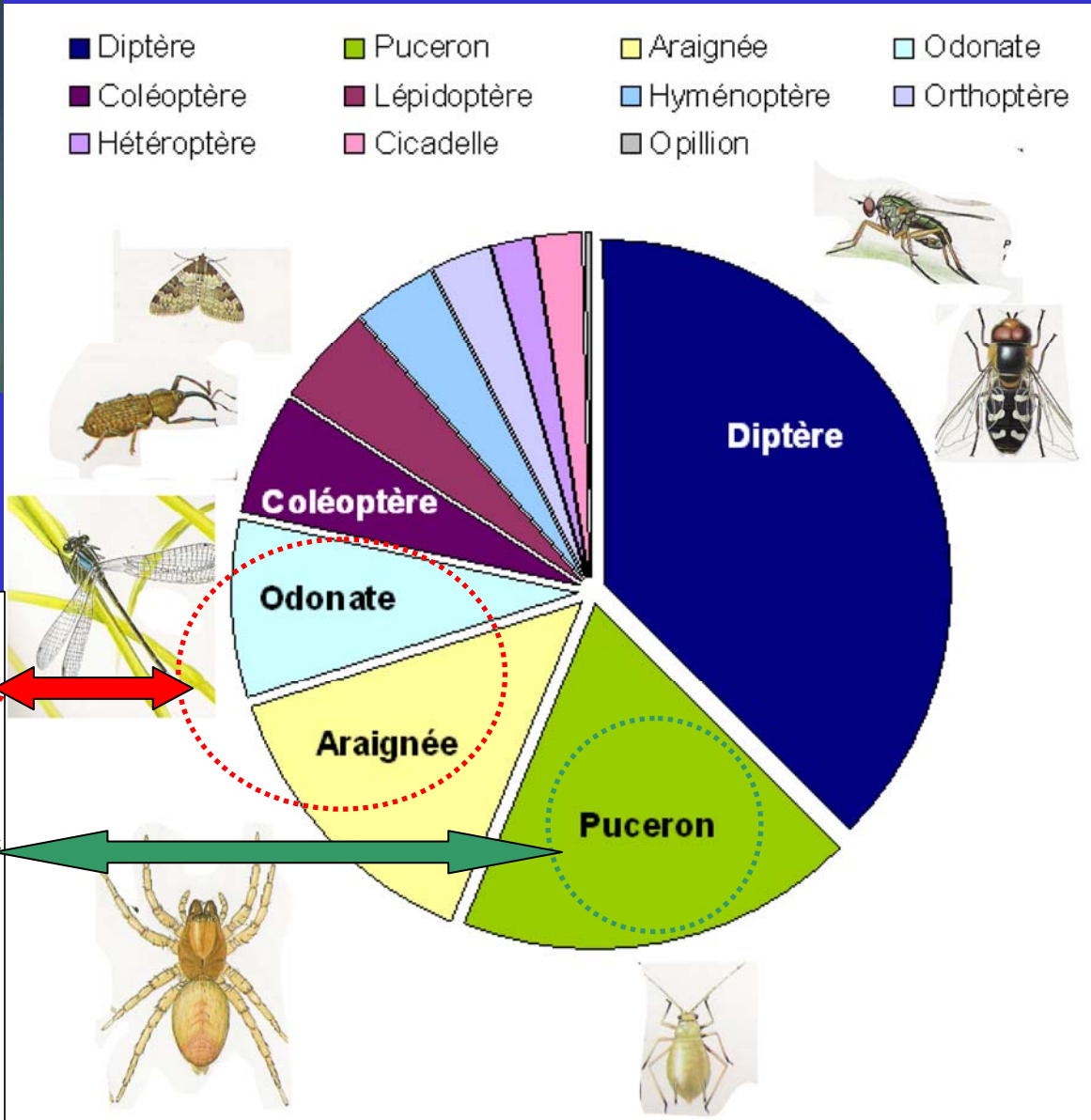
Aquatic Warbler diet

128 faeces 571 preys

Frequency

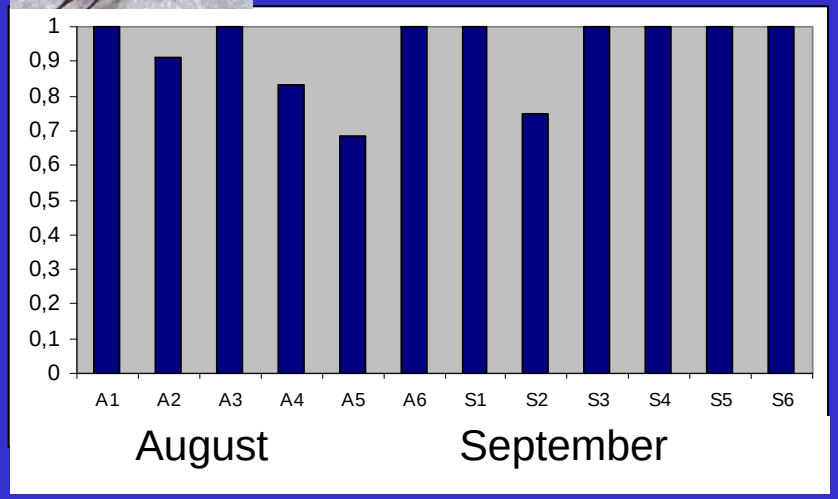


Abundance



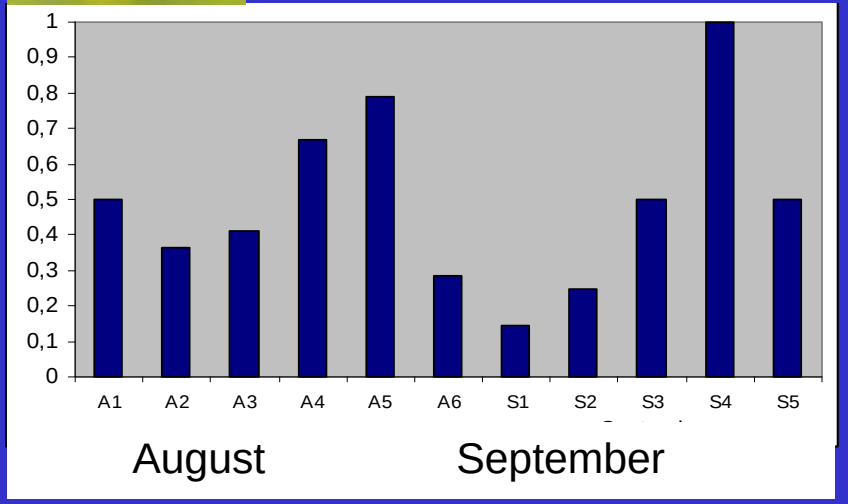
Diptera frequency

Dolichopodidae, Sirphidae



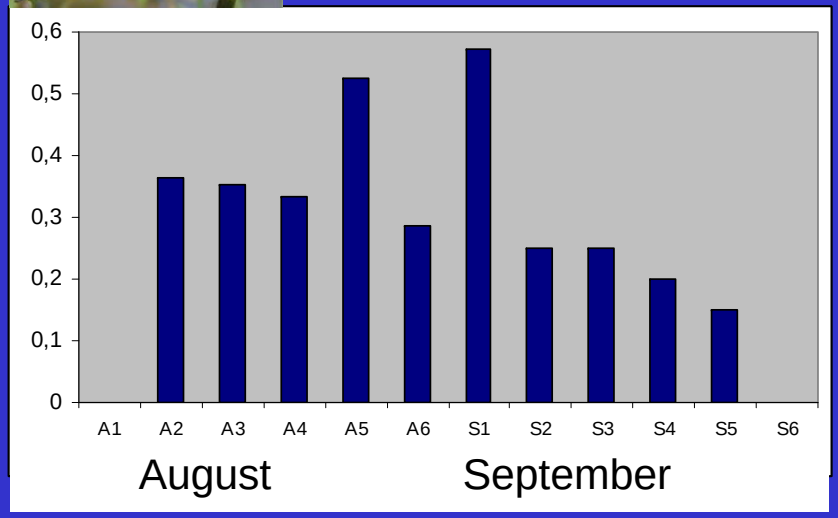
Spiders frequency

Clubiona phragmitis, Tetragnata extensa, Larinoides cornutus,



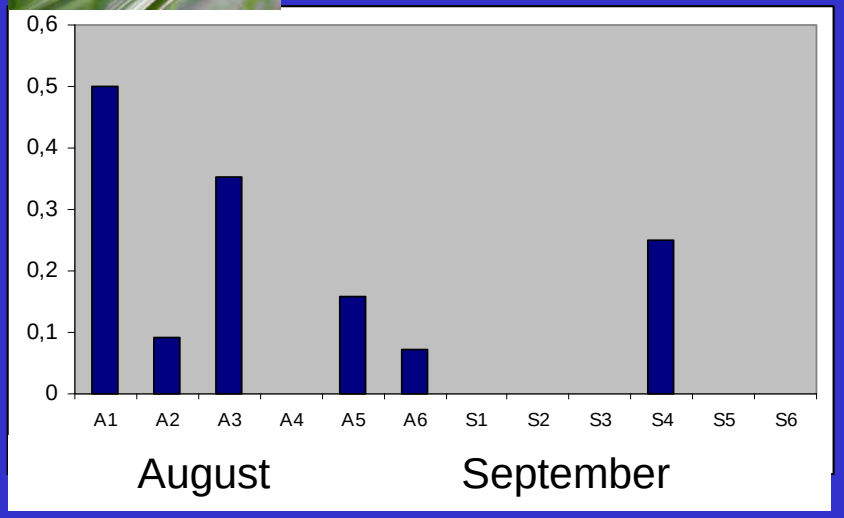
Dragonfly frequency

Ischnura elegans



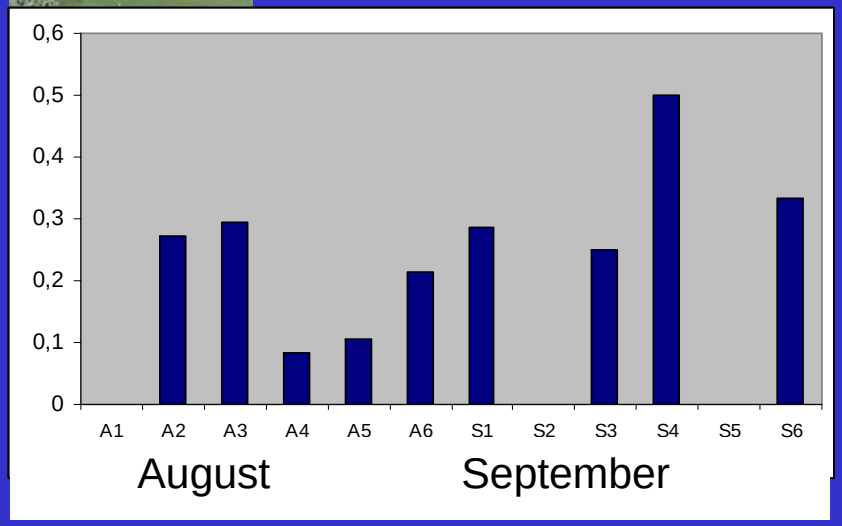
Grasshopper frequency

Conocephalus discolor

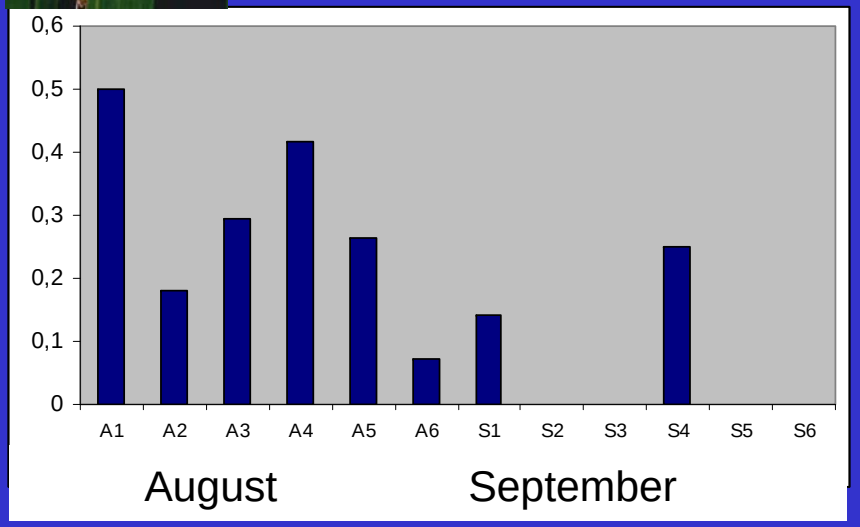


Aphids frequency

Hyalopterus pruni prob.

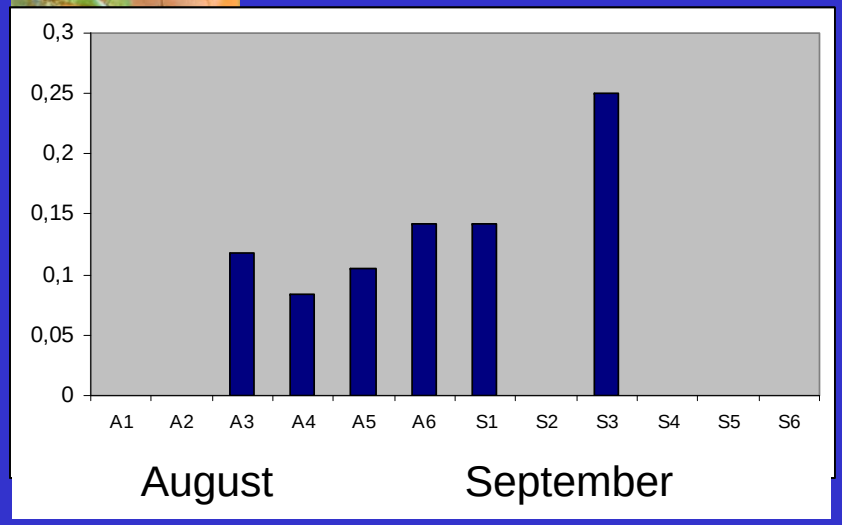


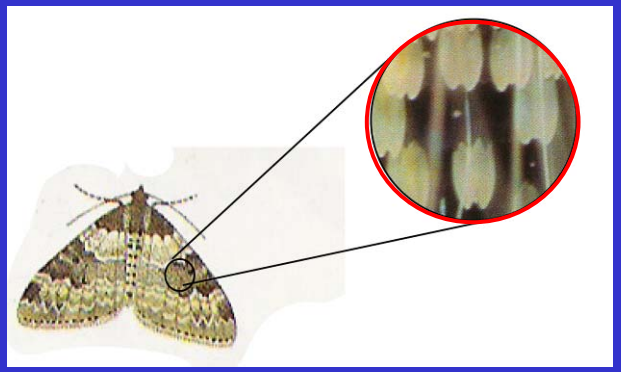
Moth frequency

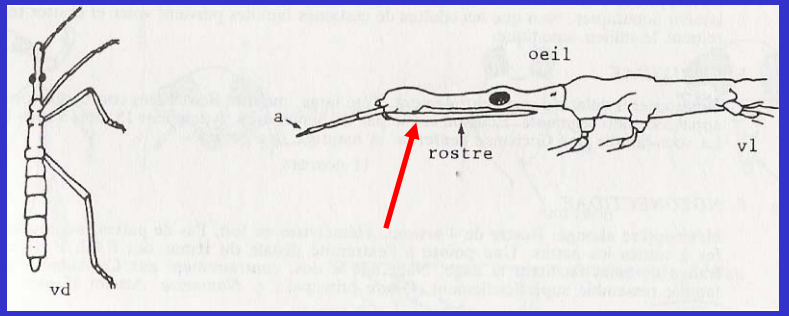


Heteroptera frequency

Hydrometra stagnatorum





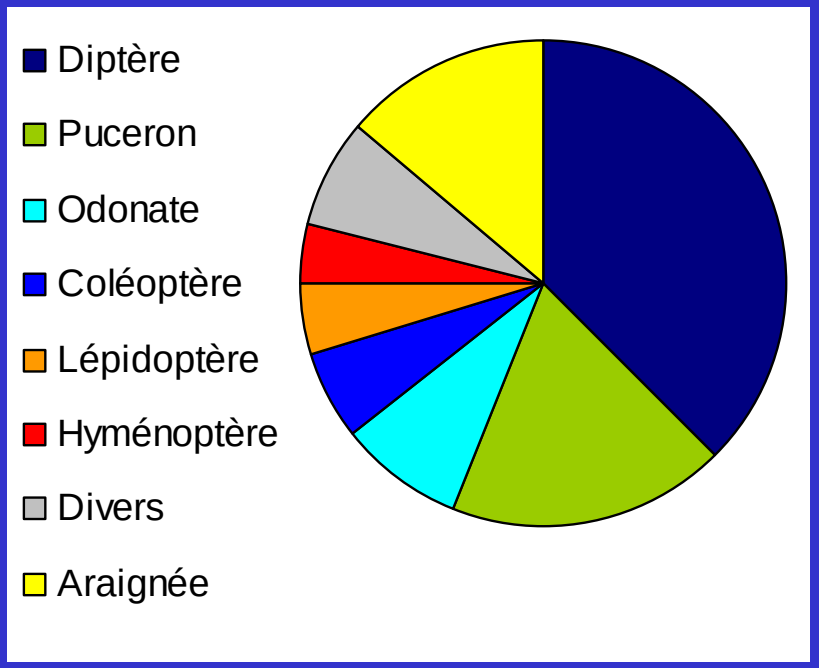


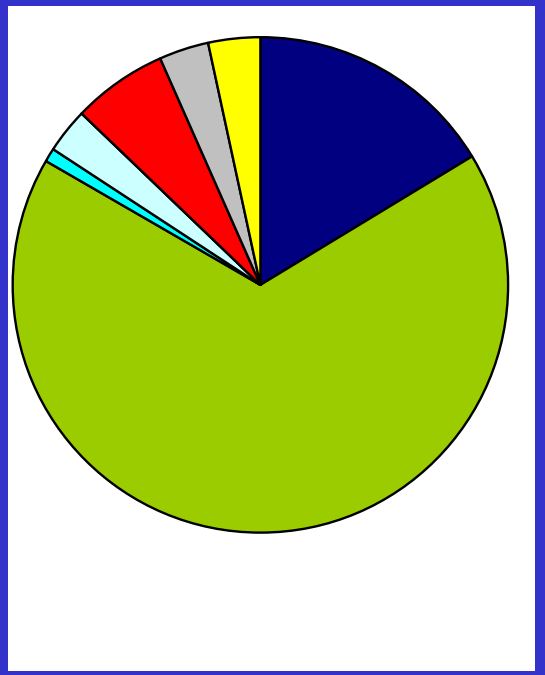
Comparison of the 3 warbler diet according to potential bias due to deferential digestibility among preys.

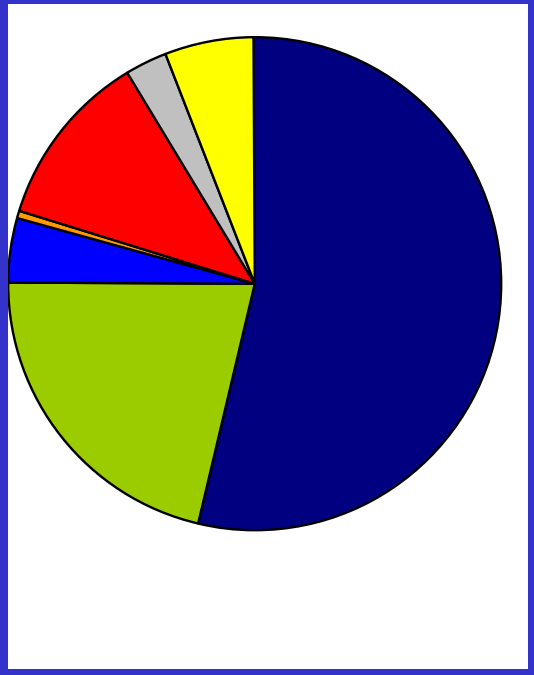
Aquatic Warbler

Sedge Warbler

Reed Warbler



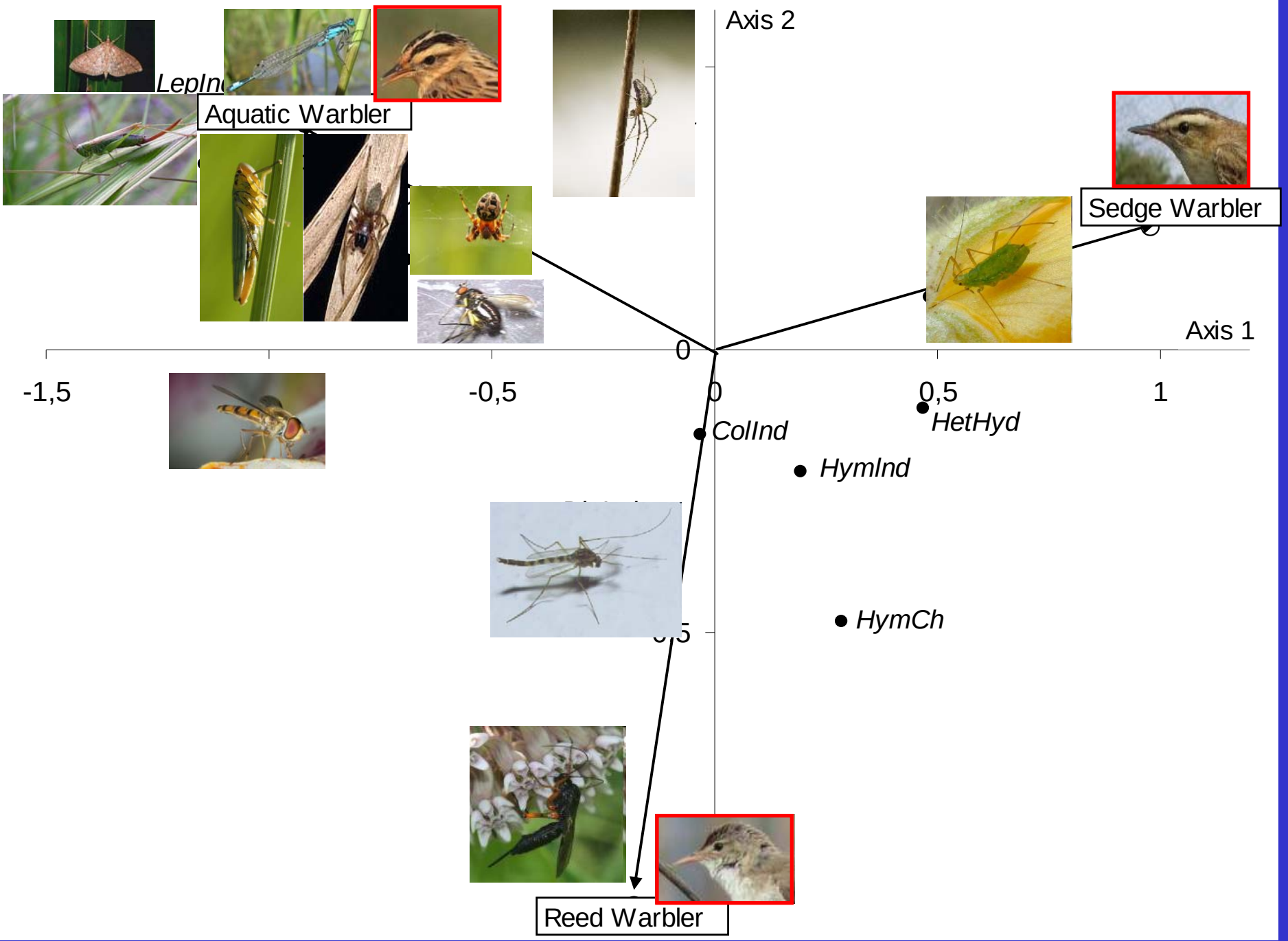




	Aquatic Warbler	Sedge Warbler	Reed Warbler
Abundance:	4,9 preys / faeces	13,2 preys / faeces	6,2 preys / faeces
Richness[1]:	16,9 taxa	28,75 taxa	22,2 taxa

1 here estimated richness for re-sample of 10 faeces, accounting for taxa preys detection (p=0.7)


HetInd
LepInd
ZygIsc
Aquatic Warbler
HomCic
AraClu
AraInd
ColCar
DipDol
DipSyr
AraTet
Axis 2
0,5
Axis 1
0
-1,5
-1
-0,5
0
0,5
1
-0,5
ColInd
HetHyd
HymInd
DipInd
HymCh
HymIch
Reed Warbler
HomAph
Sedge Warbler


Axis 2
Axis 1
0
-1,5
-0,5
0
0,5
1
LepInd
Aquatic Warbler
Sedge Warbler
ColInd
HetHyd
HymInd
HymCh
Reed Warbler

BIOMASS

Axis 2

0,5

Axis 1

-1,5 -0,5 0 0,5 1

-0,5

Sedge Warbler

HomAph

HetHyd

ColInd

HymInd

DipInd

HymCh

HymIch

Reed Warbler

To sum up part 1

The diet composition of the Aquatic Warbler observed on migration stopover site is that of a specialist species:

1) Significantly fewer prey were found in Aquatic Warbler faeces

2) Species richness low

3) But more specific preys species

4) Larger preys (dragonfly, grasshopper, spider, moth) 9,2mm in average

5) Diet on migration stopover site presented great similarities with diet on breeding sites

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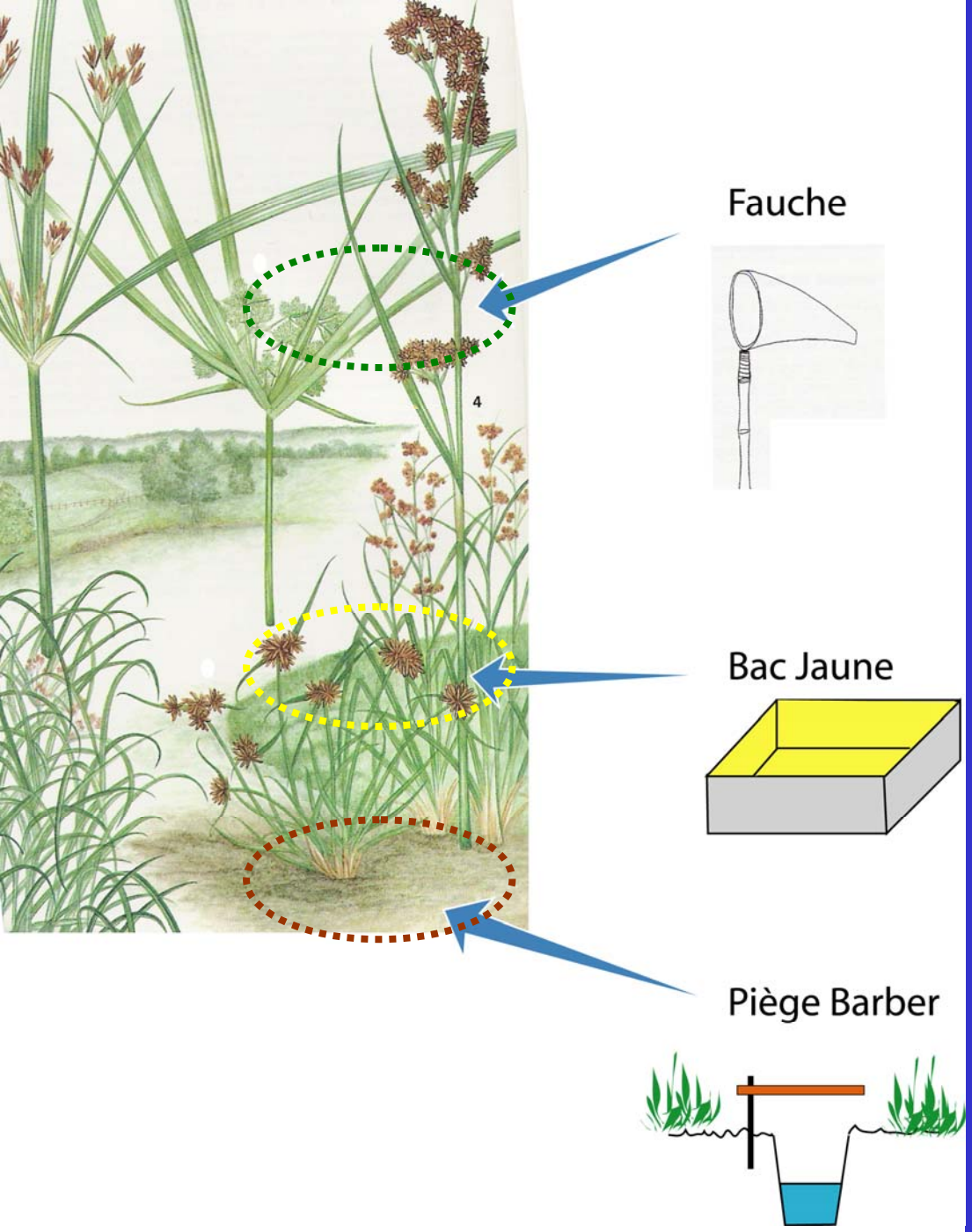


METHODS:

3 invertebrate sampling methods

- Sweep net
- Blow trap
- Pitfall trap

Comparison between spiders families observed in faces and their distribution among the different sampling methods used:

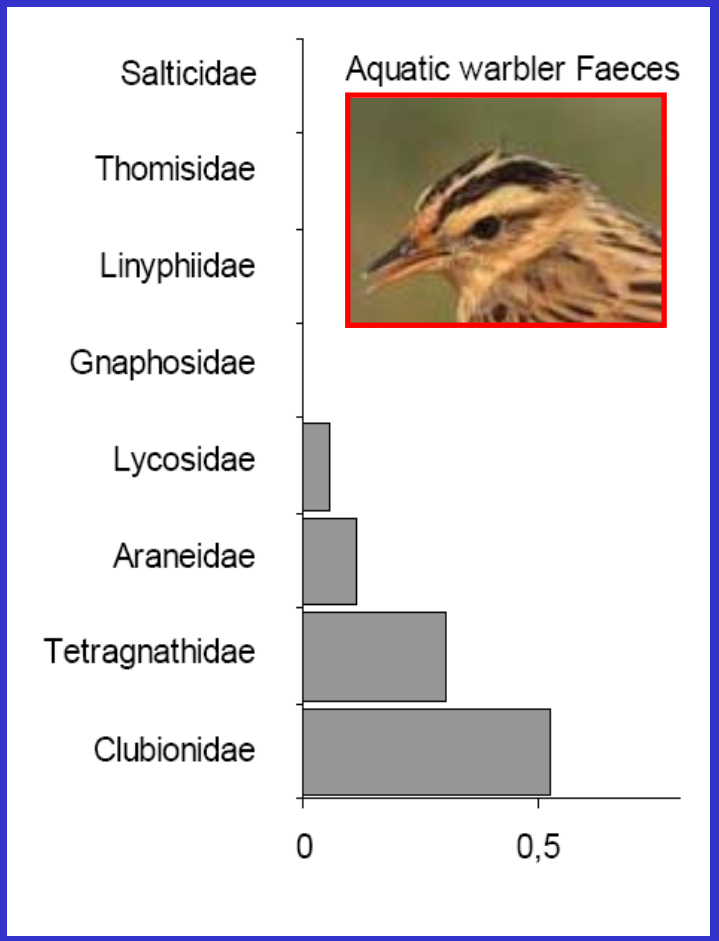
Species located at vegetation top

Within vegetation active species

Soil surface active species

Comparison between spiders families observed in faces and their distribution among the different sampling methods used:

Aquatic Warbler foraged on families more represented in high level of vegetation



Comparison between spiders families observed in faces and their distribution among the different sampling methods used:

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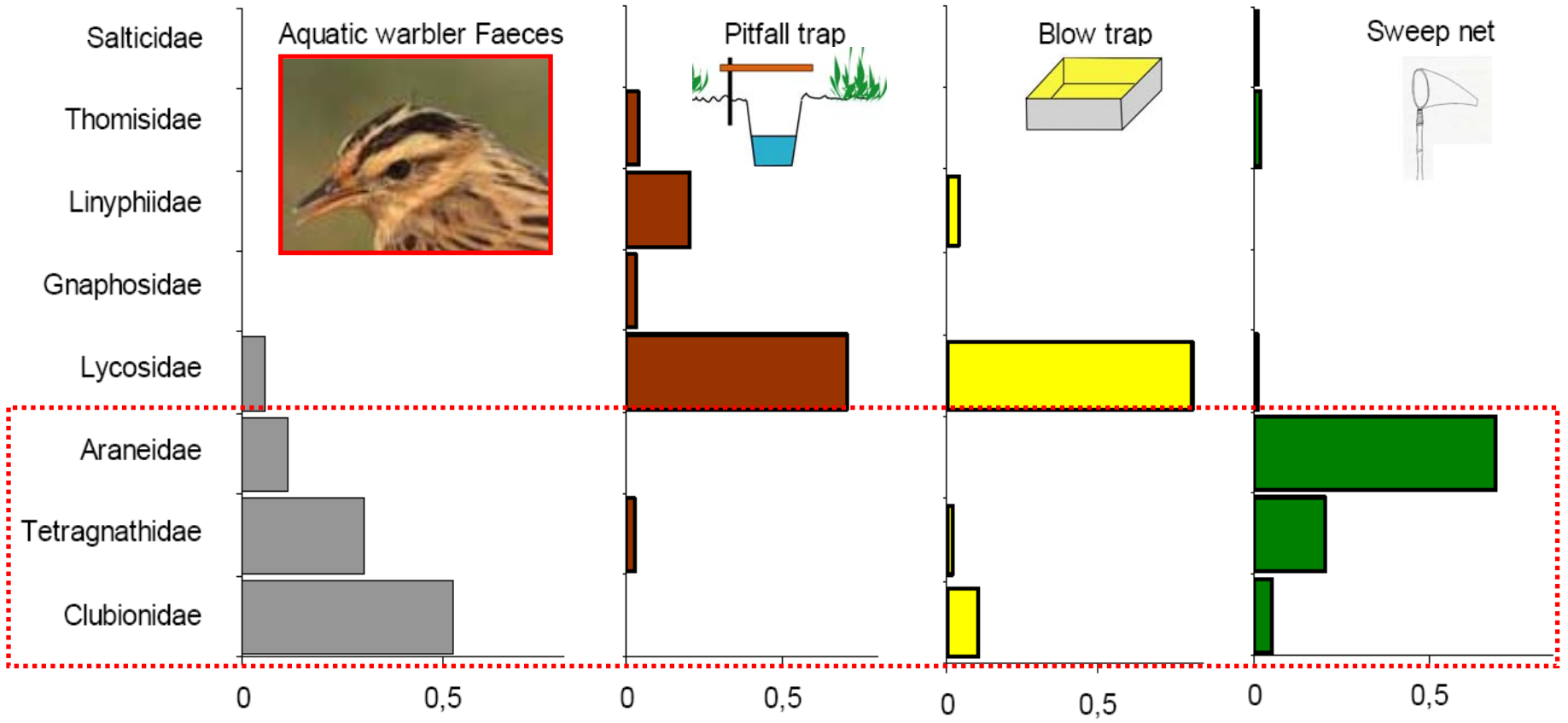
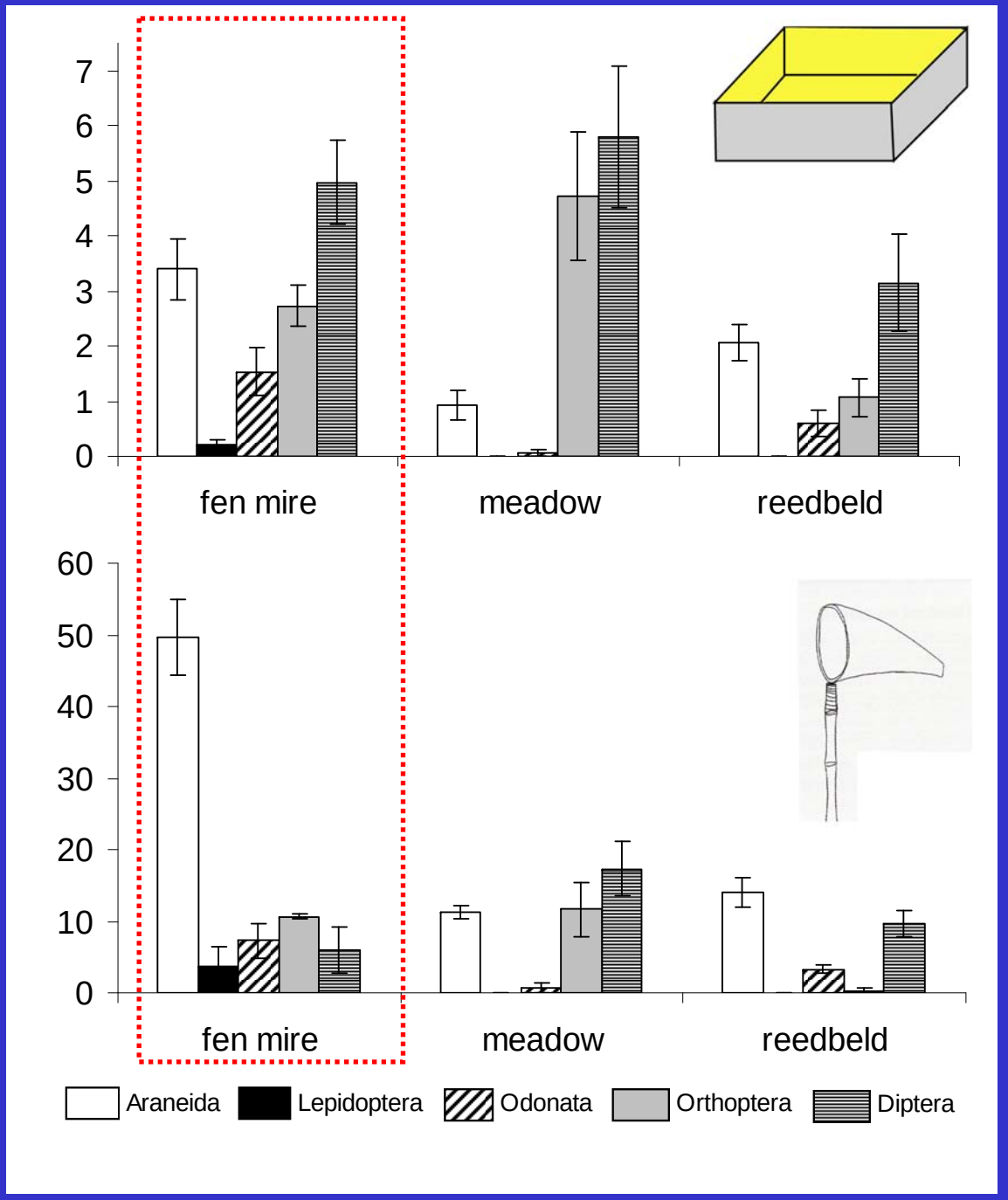


Availability of principal prey's varied across habitat and whatever the sampling methods used, fen mire shelter greater abundance than reedbeld

Fen mire

Meadow (grazed)

Reedbeld



To sum up part 2

In regards to the Aquatic Warbler diet, most of its main preys occurred with larger abundance in fen mire. The occurrence of the different spiders families indicated that it foraged mainly in high level of this vegetation.

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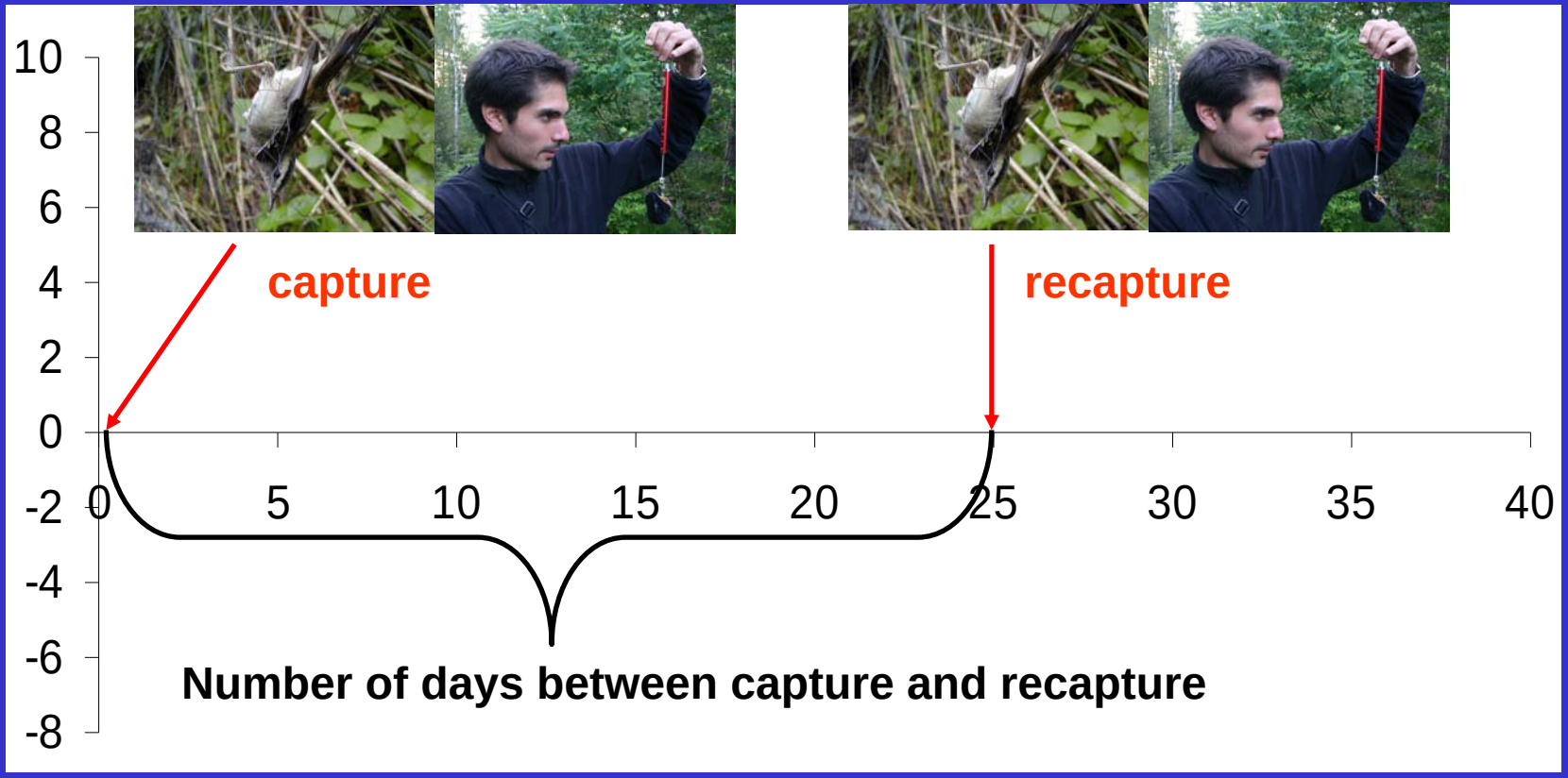
METHODS: Analysis of mass variation

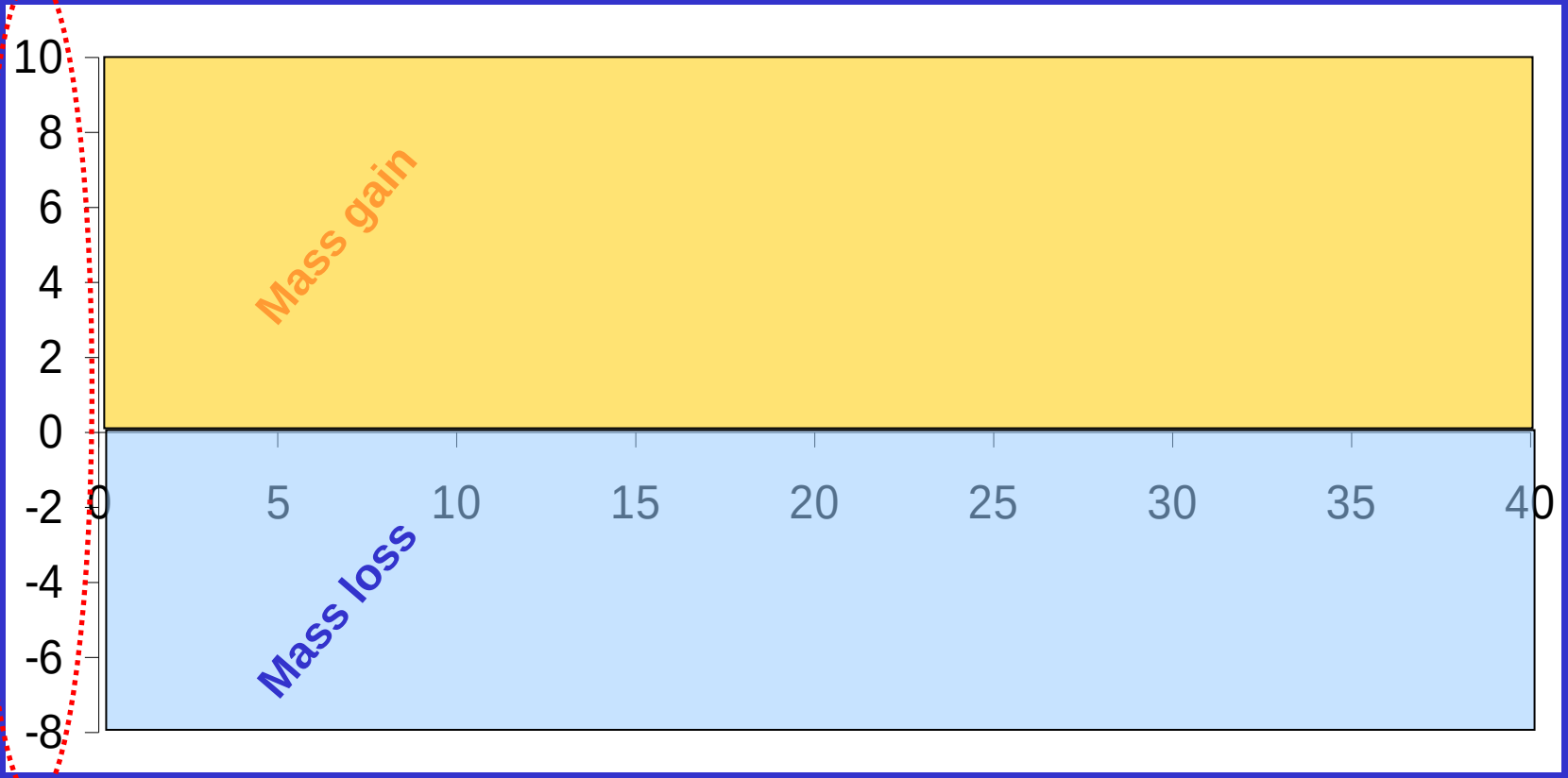


METHODS: Analysis of mass variation

Relative mass gain (*G'*)

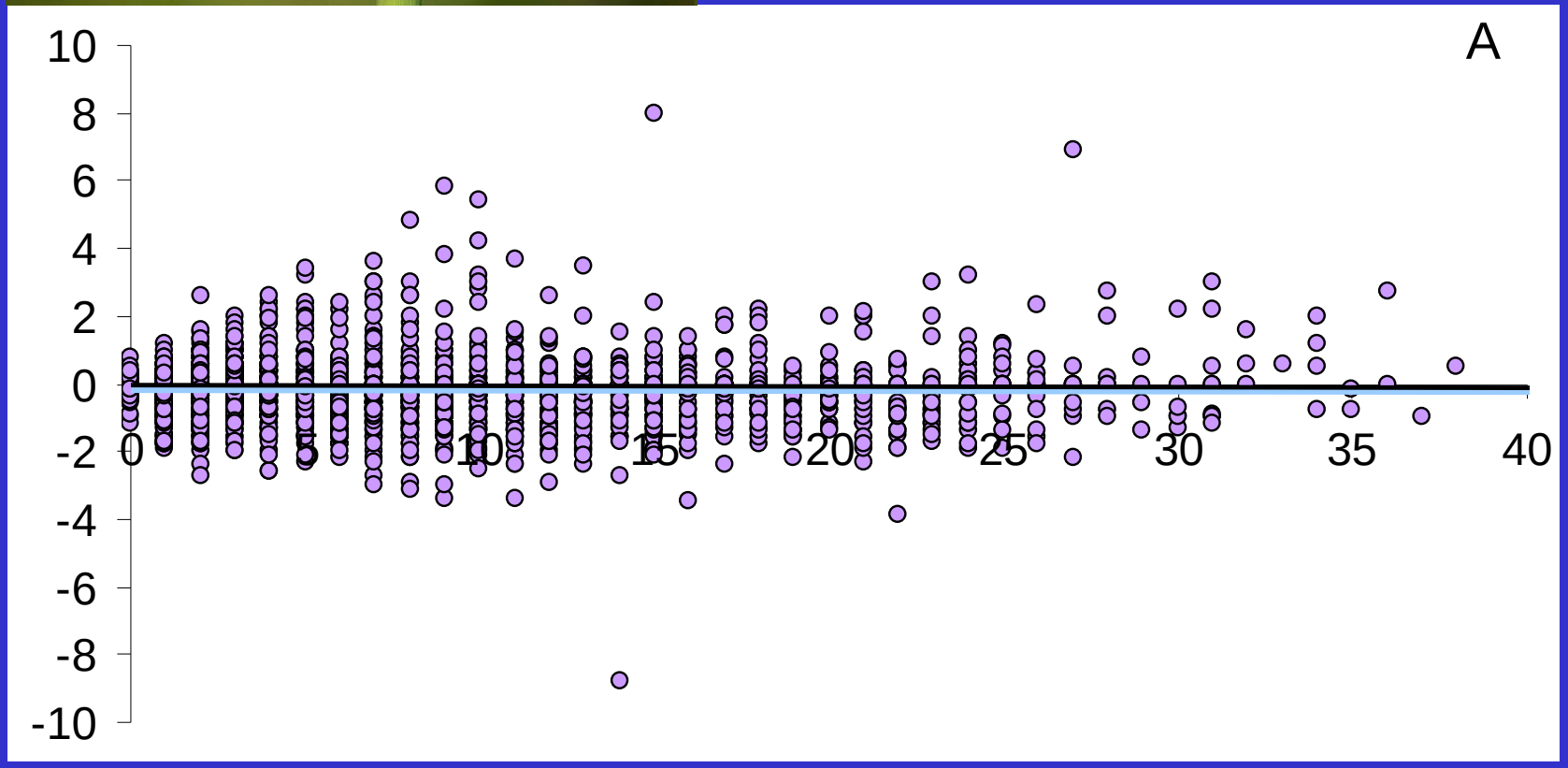
$$G' = \frac{(Mr - Mc)}{Mc}$$

Where *Mc* is the mass measured during the first capture and *Mr* is the mass measured during the recapture.



Mass gain strategy in stopover

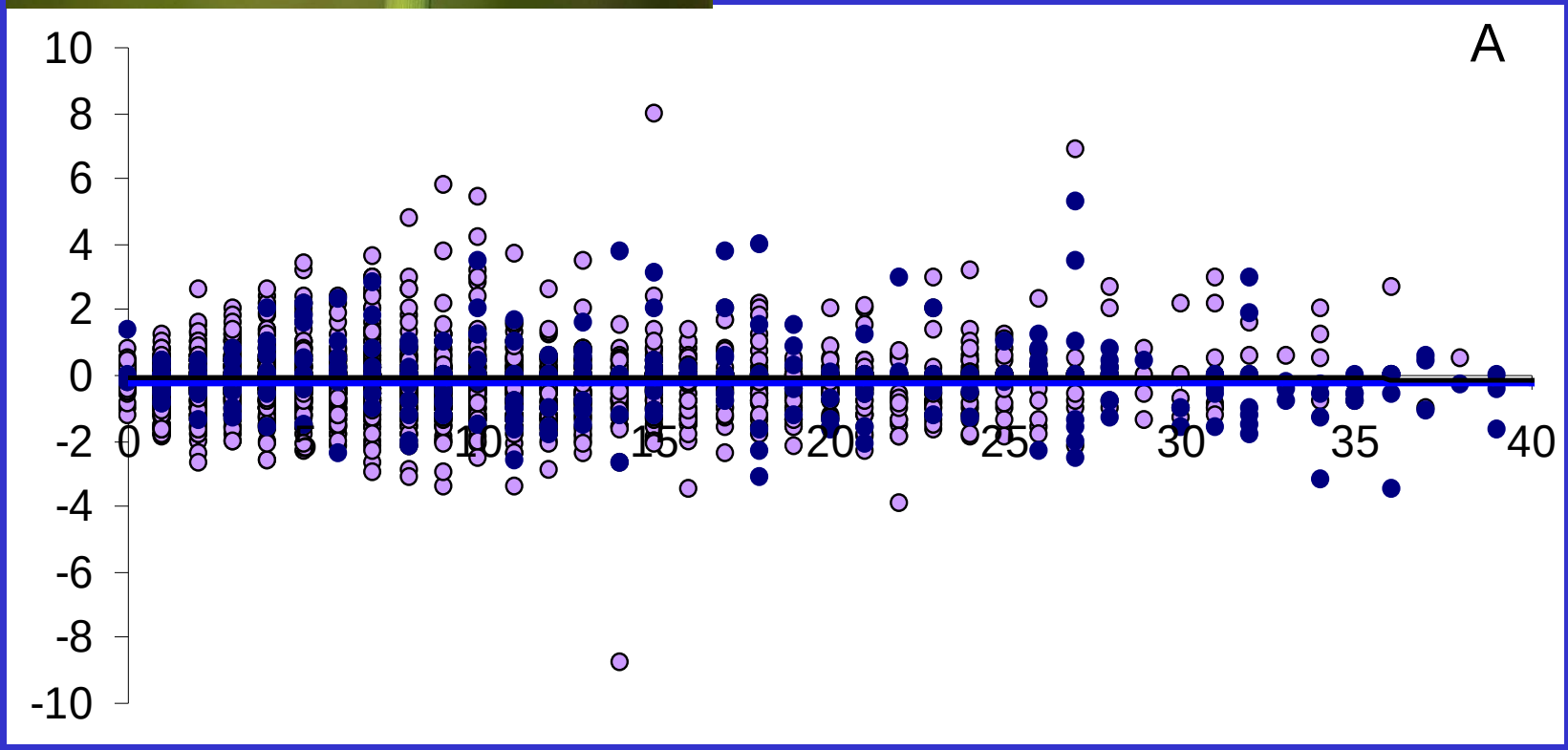
Reed Warbler Juvenile



Mass gain strategy in stopover

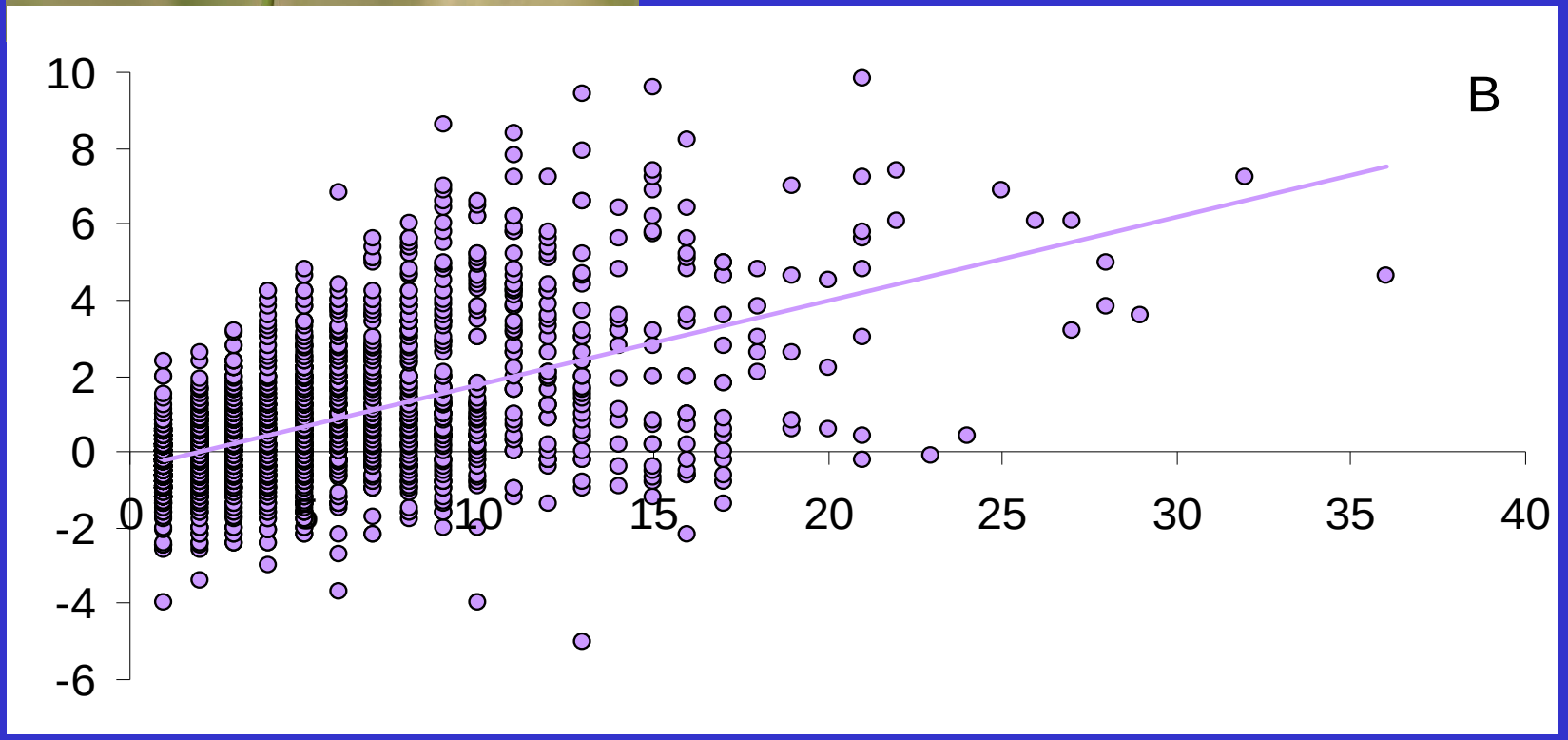
Reed Warbler Juvenile

Reed Warbler Adult



Mass gain strategy in stopover

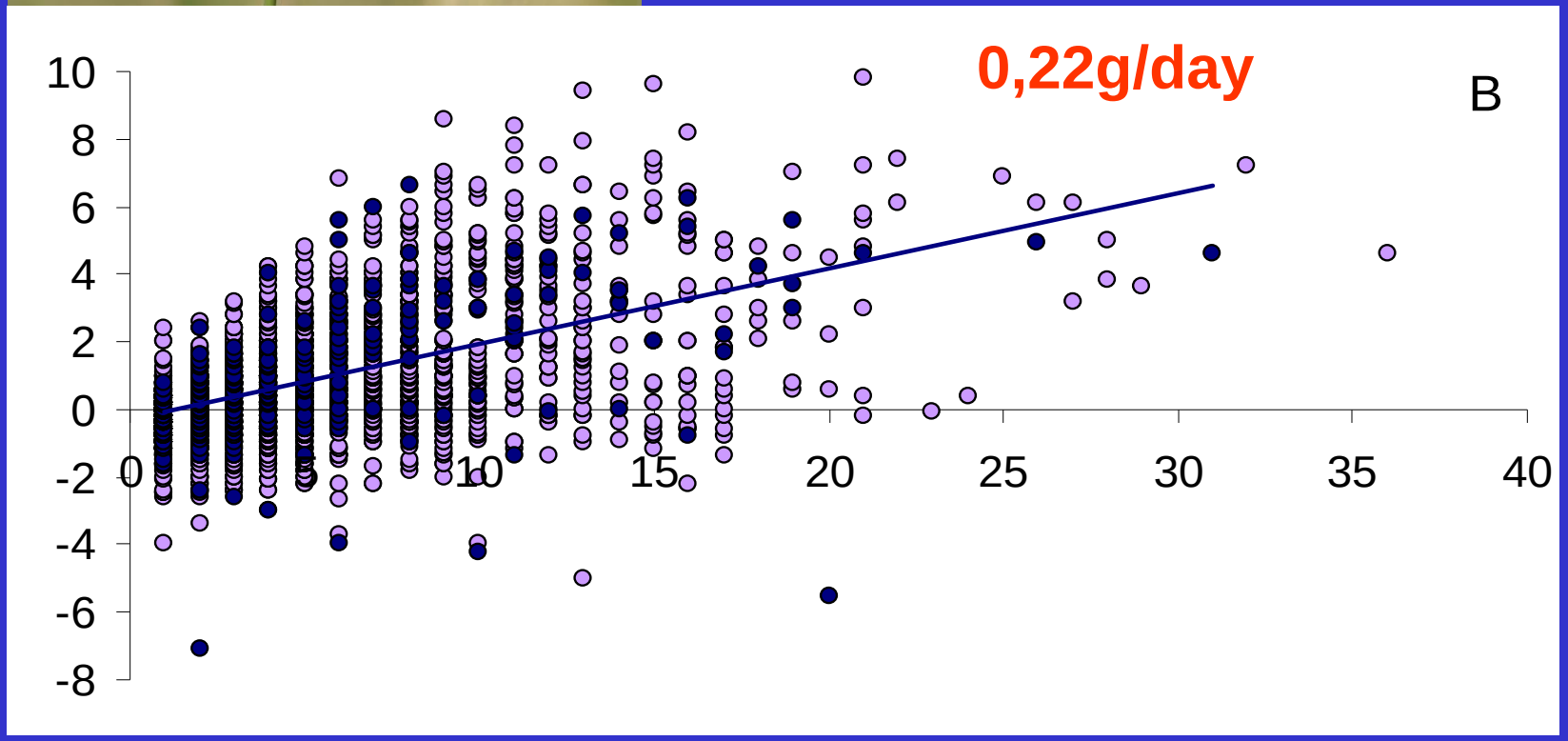
Sedge Warbler Juvenile



Mass gain strategy in stopover

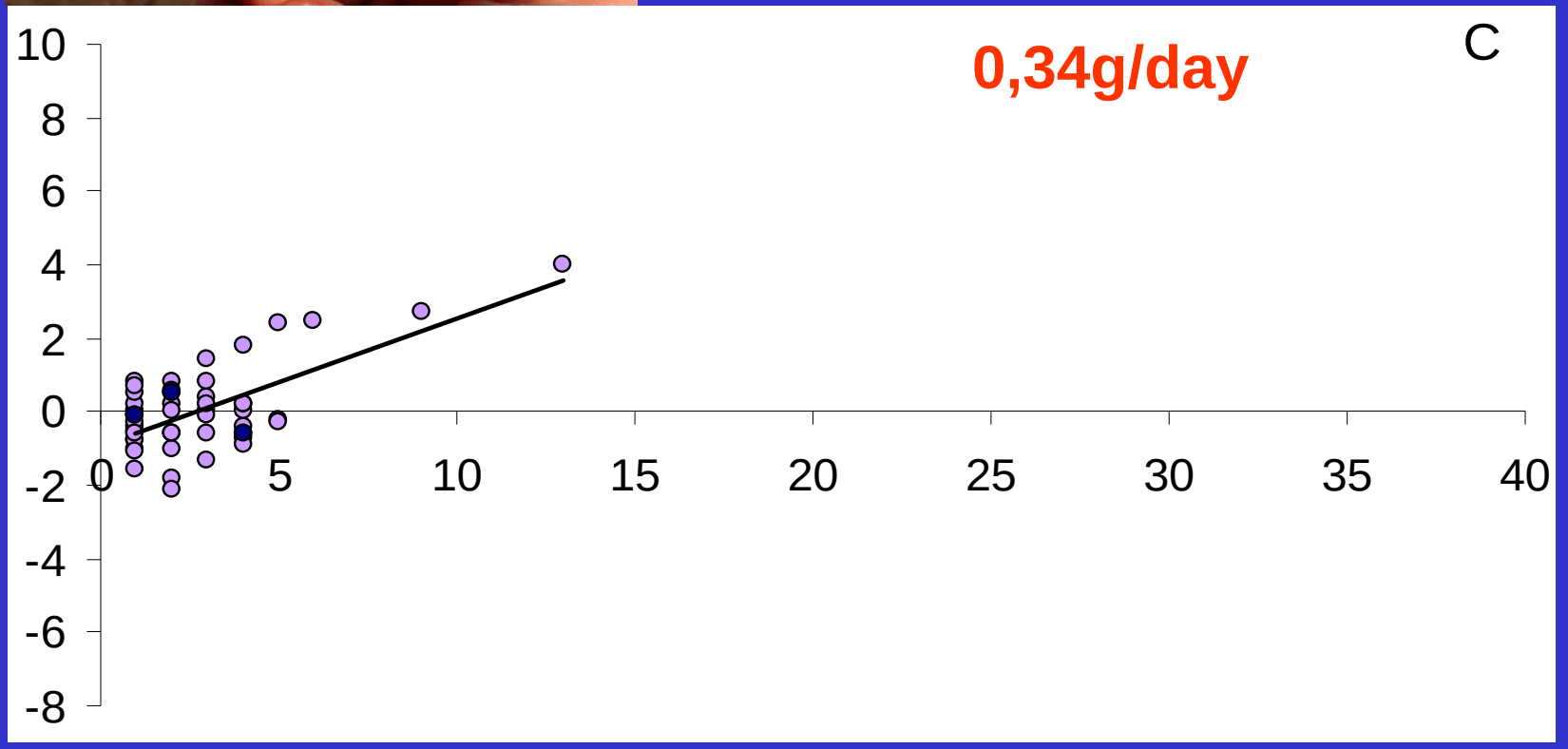
Sedge Warbler Juvenile

Sedge warbler Adult



Mass gain strategy in stopover

Aquatic Warbler (Juvenile + Adult)



To sum up part 3

Mass gain strategies are vey close for the Aquatic Warbler and the Sedge Warbler: they both exhibited a significant increase in body mass during their stopover, suggesting accumulation of fat reserve.

This conclusion ties in with previous studies of migration patterns, which all suggest that the migration strategy of the Aquatic Warbler is closer to that of the Sedge Warbler than to that of the Reed Warbler. Sedge Warblers, which migrate earlier and more rapidly, seem to accumulate fat in Northern France or Southern England and fly almost directly to West Africa over Iberia. In contrast, Reed Warblers migrate more slowly, thus over a longer period and break up the journey by refuelling in Spain and Portugal. However, although both Aquatic and Sedge Warblers share refuelling stopovers in Channel and Atlantic littoral marsh complexes, more precisely in Western France for the Aquatic.

Conclusion

According to mass gain strategy and first knowledge on stopover network of the Aquatic Warbler, (important refuelling on few stopover migration) this species is then expected to be more impacted by degradation or loss of some important refuelling stopover migration.

In French Atlantic stopover sites, consisting mostly in large areas of Common Reed (*Phragmites australis)* closed to open water. Reedbeld are certainly an important habitat, however our study underlined that several preys species occur with higher abundance in fen mires which constitute at least an habitat of preys production and very likely a foraging habitat. Then conservation measures should therefore maintain areas of medium vegetation such as sedge.

In addition the creation of small ponds close reedbelds an fen mire is expected to provide habitat patches with exceptional densities of Dolichopodidae (Diptera) and Dragonflies.

Restoration management, such as clearing could appeared as one solution, however, reed cutting, especially cutting for commercial reasons, appears to affect the arthropod communities, with e.g. observed decreases in some passerine bird preys (Schmidt *et al.,* 2005). To minimize negative effects, reed cutting should be restricted to small areas, connected with uncut areas, which allows arthropods recolonization.

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