STUDY OF ECOLOGICAL SUCCESSION OF BENTHIC COMMUNITIES MACOINVERTEBRADOS IN THE PROCESS OF COLONIZATION OF A SMALL WATERCOURSE AFTER A LONG DROUGHT

Teresa Jesus

XVI Congress of the Iberian Association of Limnology

6 - 11 July 2014, Santander, Spain

Introduction

Flow patterns changes

- Impose changes on biological processes and patterns
- Has a preponderant role on the communities distribution

The communities answers:

- depends on their resistance (capacity of remain with the same structure face a disturb) and resilience (recuperation capacity face to a disturbs)

Benthic Macroinvertebrates

- Group of organisms that present a great diversity of anatomical, physiological and ecological characteristics
- They colonize every kind of aquatic ecosystems

Good indicators of **Water Quality**

- **Richness and diversity indexes**
- **Metrics**
- **Biotic Indexes**
- **Structure of communities**

Objectives

- Study the changes on the structure of benthic macroinvertebrate communities along the recolonization time after a period of total drought of a section of the Poço Negro creek, a small water course in the North of Portugal

Methodology

Parameters

Hydromorfological parameters

- Substrate composition
- Width and Depth
- Habitat Quality

Benthic macroinvertebrates

Nov-09 to May-10; Oct-10 to May-11;
Mar-12; Dec-12 to May 13;
Oct-13 to May-14

- **Sampling with a hand net**

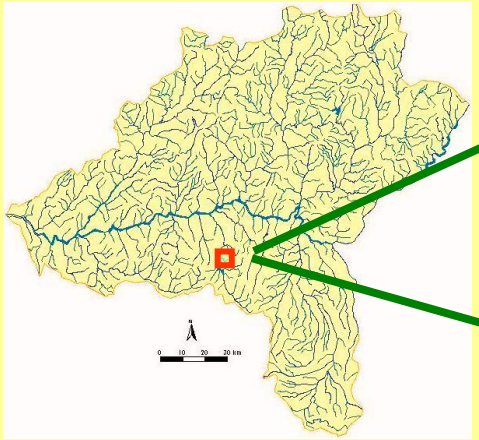
Data analysis

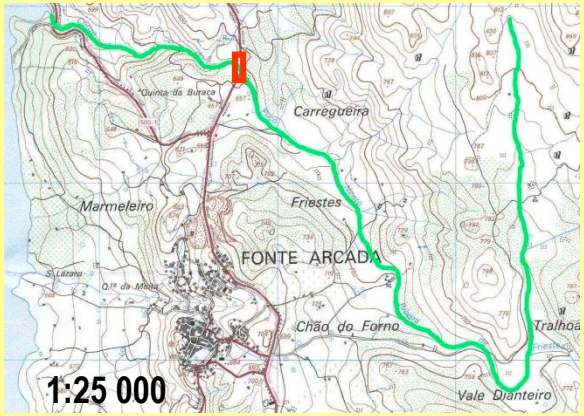
Index and metrics

- Number of organisms and taxa
- Biotic indexes: $IPtI_N$ and IBMWP
- Shannon-Weaver diversity index and Pielou eveness index
- Some metrics

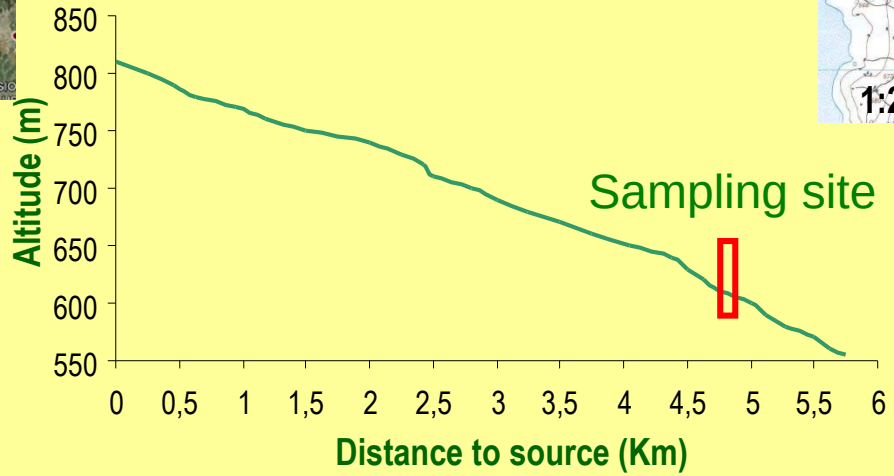
- ➔ Temporal variation of all parameters
- ➔ N-MDS analysis of macroinvertebrates grouped into their functional groups
- ➔ Validation and determination of the main groups responsible for the differentiation of the sample points using ANOSIM and CLUSTER analysis

Poço Negro creek

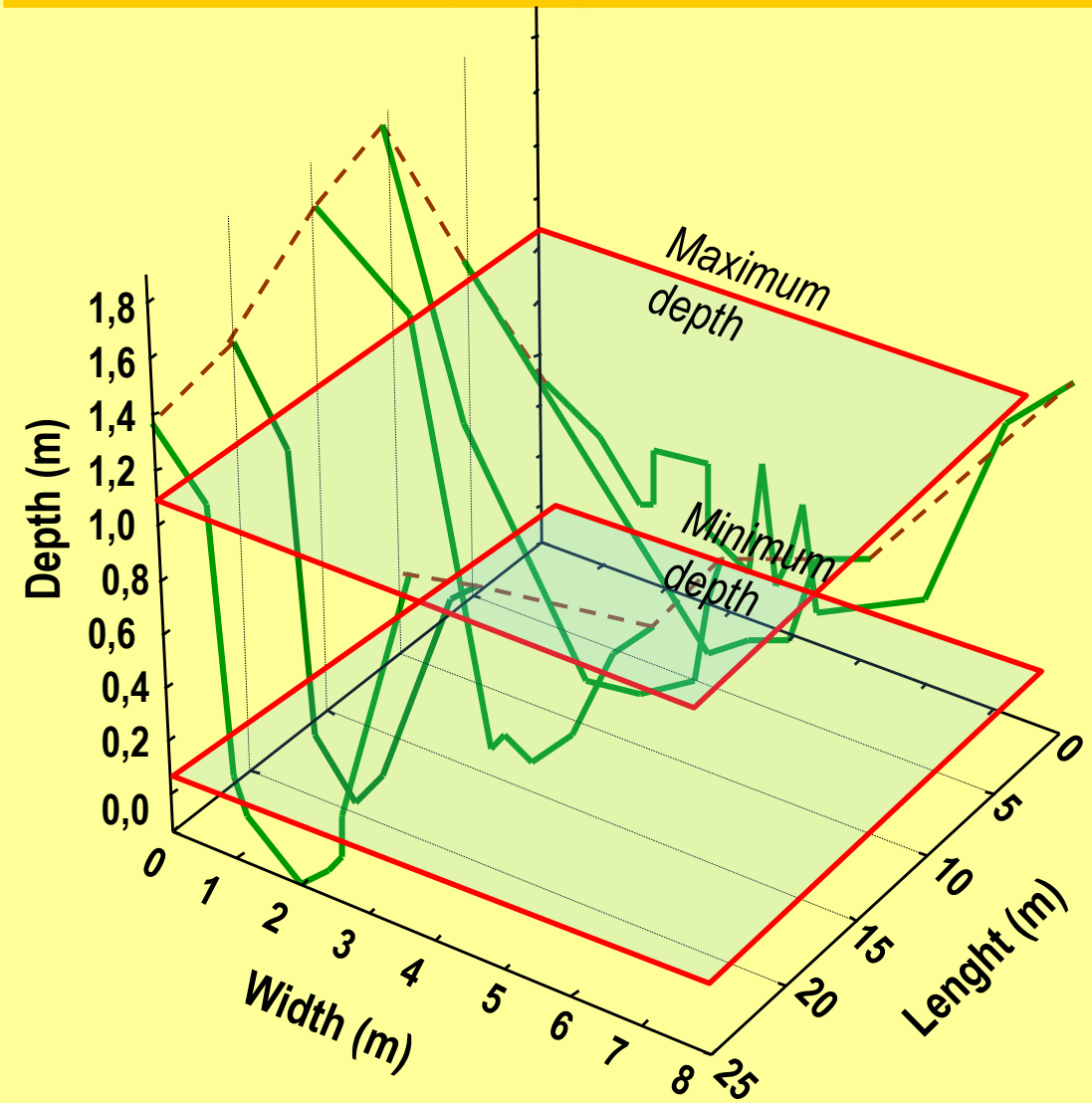




River type: Small dimensions Alto Douro rivers



Samplig site characterization



QBR: 95 (Not disturbed, natural state)

EPA, 1999: 182 (Not disturbed, considered as a reference stream)

%macrophytes: 65%

%canopy: 90%

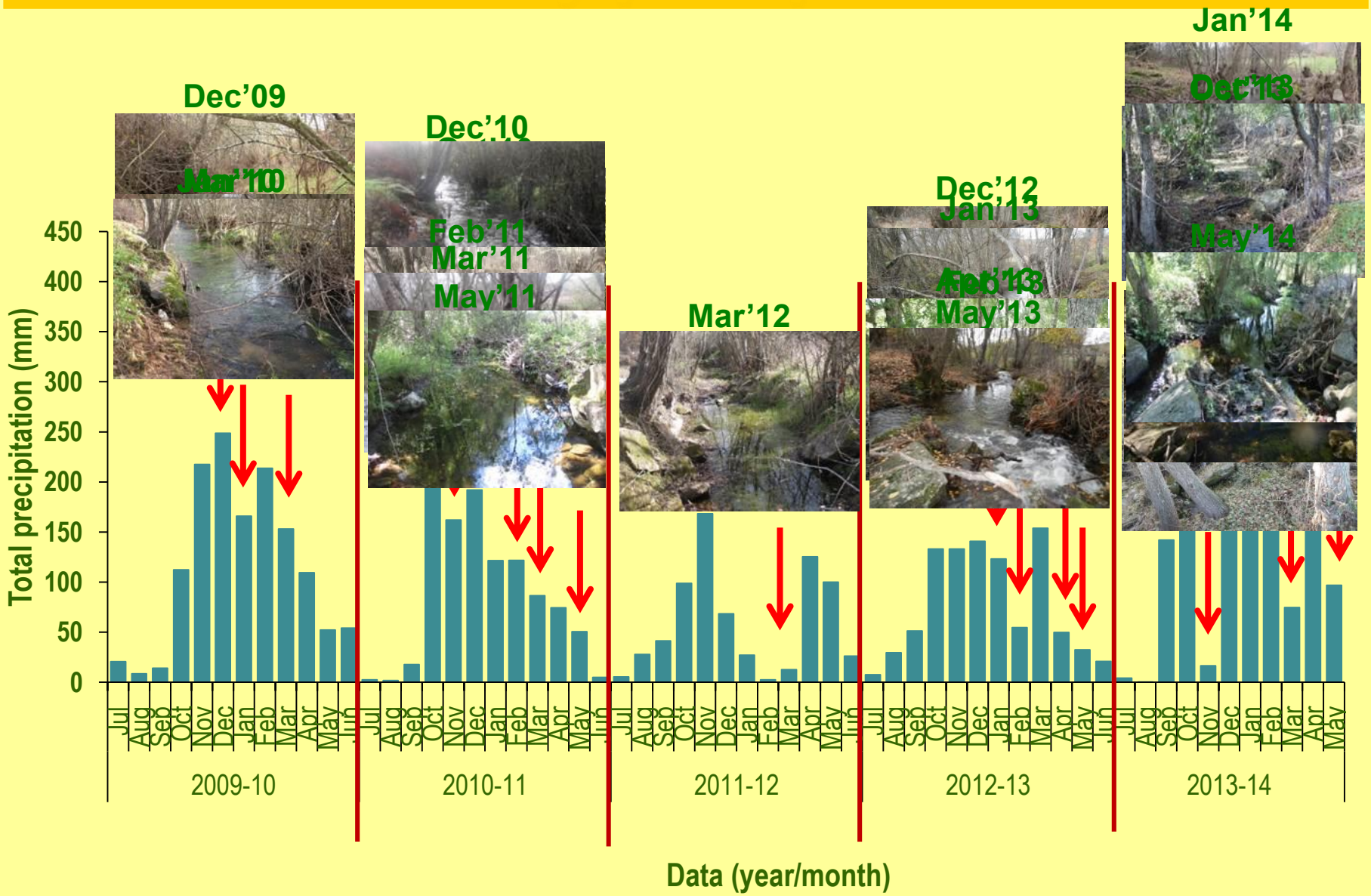
Average pH: 6,4

Average %O_2: 97%

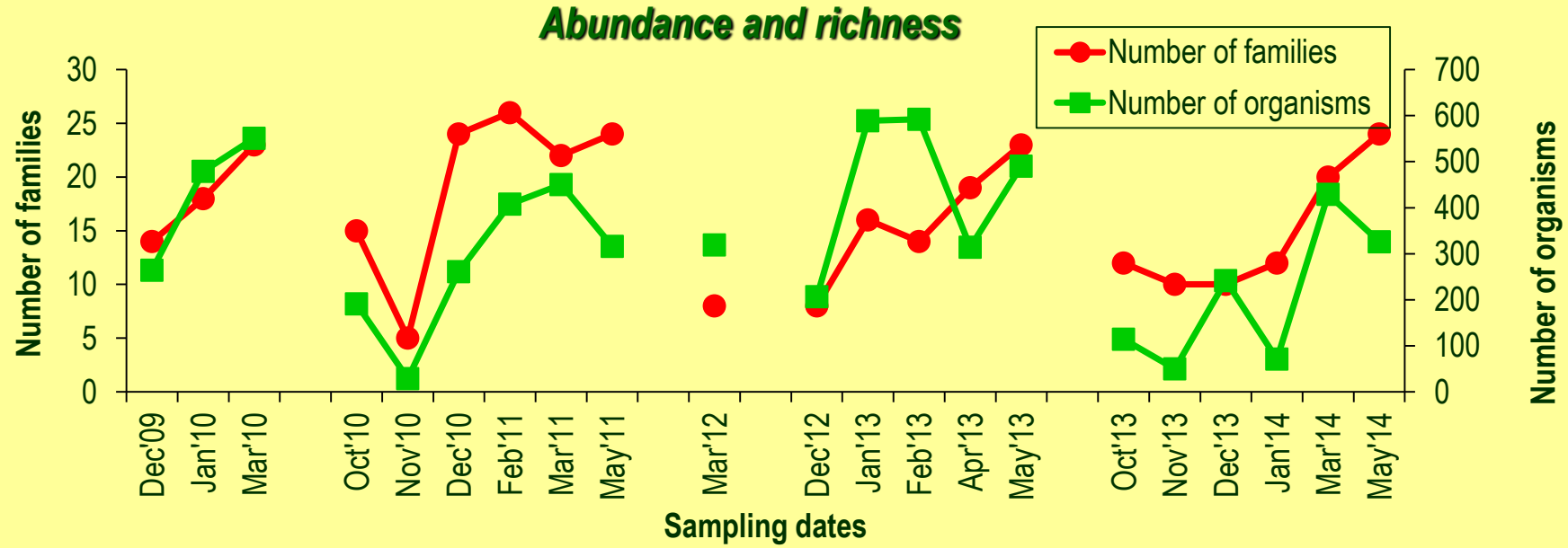
Average O_2: 9,8 mg/L

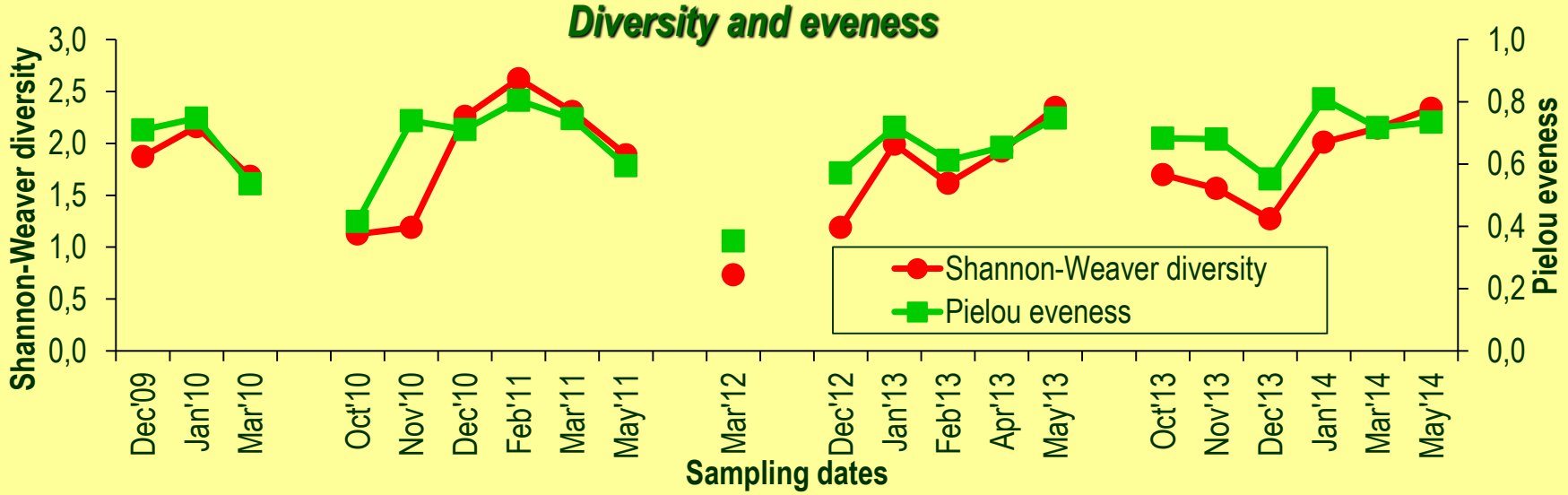
Average condutivity: 56 µS/cm

Monthly precipitation



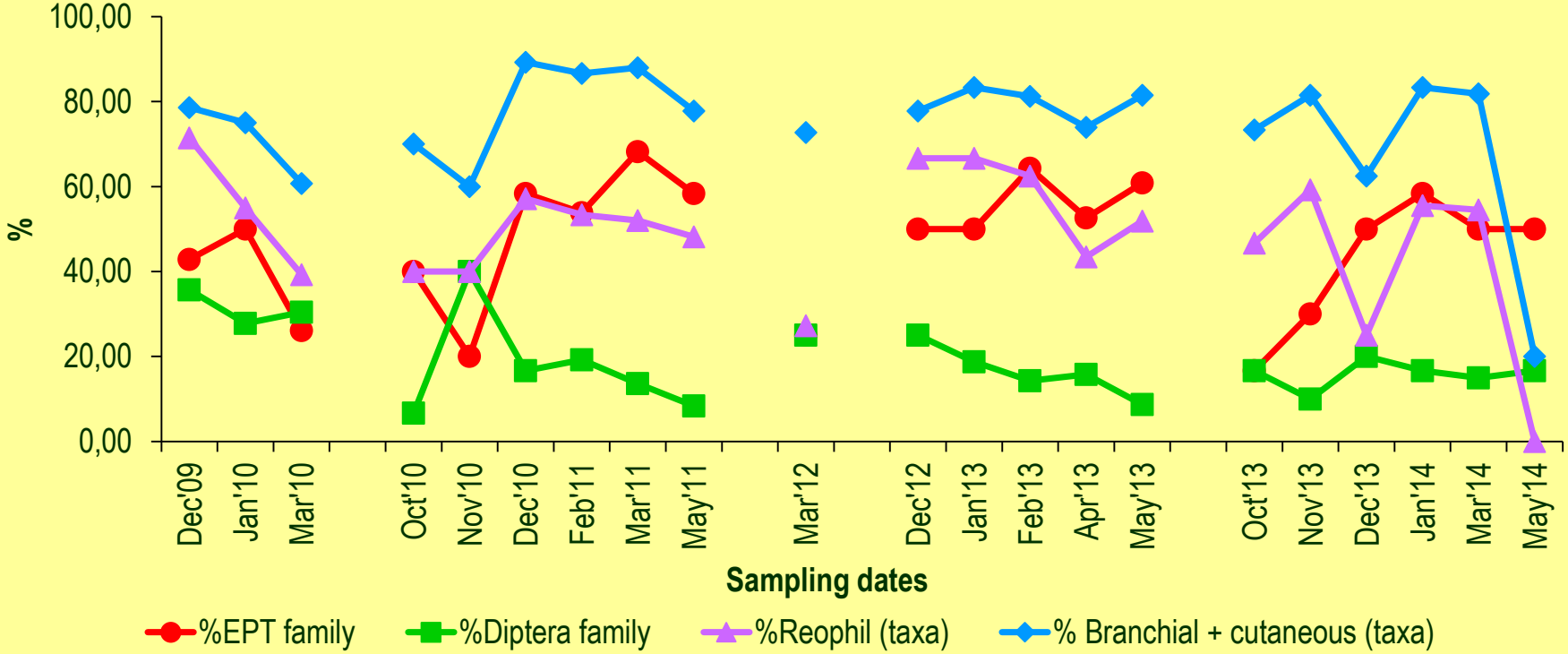
Results


Abundance and richness
Number of families
Number of organisms
Number of families
Number of organisms
30
25
20
15
10
5
0
700
600
500
400
300
200
100
0
Dec'09
Jan'10
Mar'10
Oct'10
Nov'10
Dec'10
Feb'11
Mar'11
May'11
Mar'12
Dec'12
Jan'13
Feb'13
Apr'13
May'13
Oct'13
Nov'13
Dec'13
Jan'14
Mar'14
May'14
Sampling dates


Diversity and eveness
Shannon-Weaver diversity
Pielou eveness
Shannon-Weaver diversity
Pielou eveness
3,0
2,5
2,0
1,5
1,0
0,5
0,0
1,0
0,8
0,6
0,4
0,2
0,0
Dec'09
Jan'10
Mar'10
Oct'10
Nov'10
Dec'10
Feb'11
Mar'11
May'11
Mar'12
Dec'12
Jan'13
Feb'13
Apr'13
May'13
Oct'13
Nov'13
Dec'13
Jan'14
Mar'14
May'14
Sampling dates

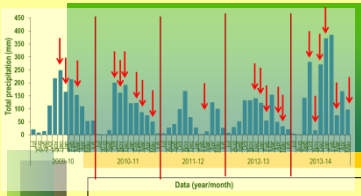
Results

Metrics

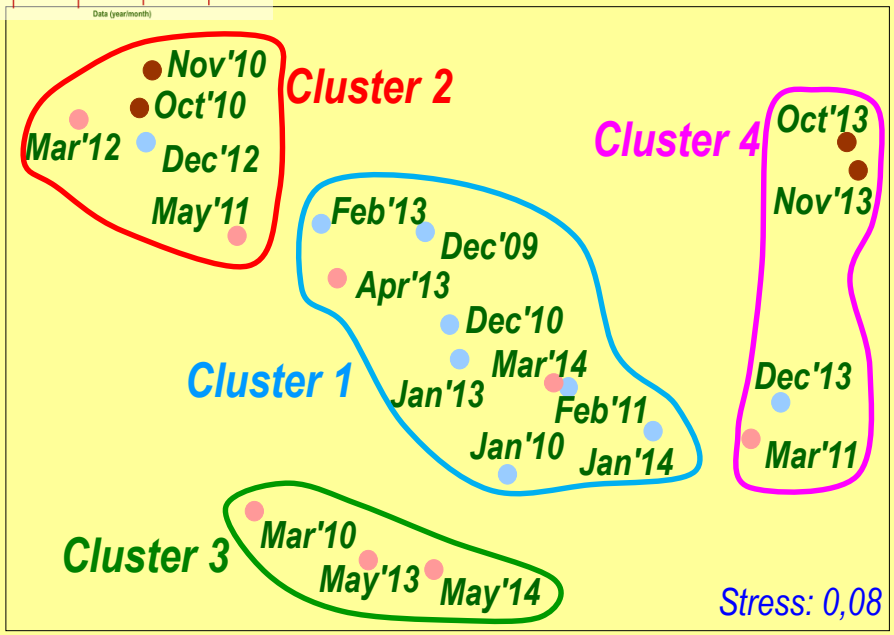


Water Quality Indexes

	Dec' 09	Jan' 10	Mar' 10	Oct' 10	Nov' 10	Dec' 10	Feb' 11	Mar' 11	May' 11	Mar' 12	Dec' 12	Jan' 13	Feb' 13	Apr' 13	May' 13	Oct' 13	Nov' 13	Dec' 13	Jan' 14	Mar' 14	May' 14
IBMWP	74	102	106	83	21	142	149	135	143	32	45	89	85	106	143	49	49	55	68	116	137
RQE	0,55	0,69	0,55	0,52	0,32	0,80	0,86	0,86	0,80	0,30	0,46	0,54	0,64	0,63	0,79	0,44	0,47	0,58	0,60	0,79	0,80

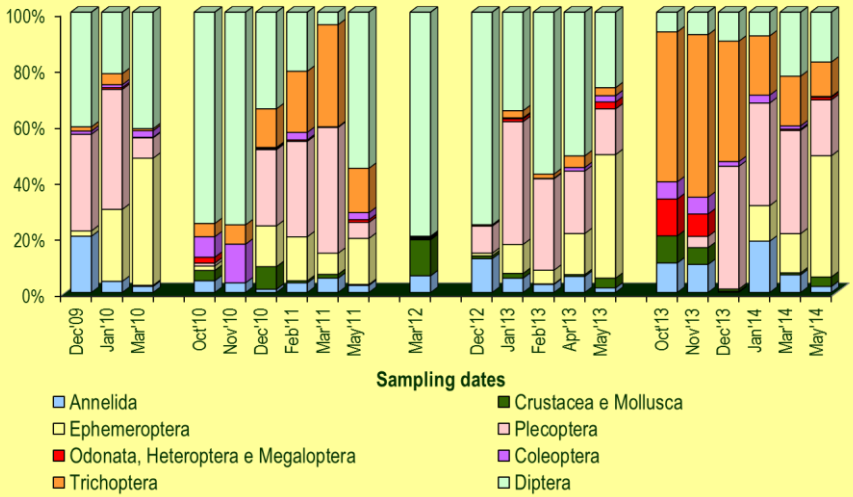


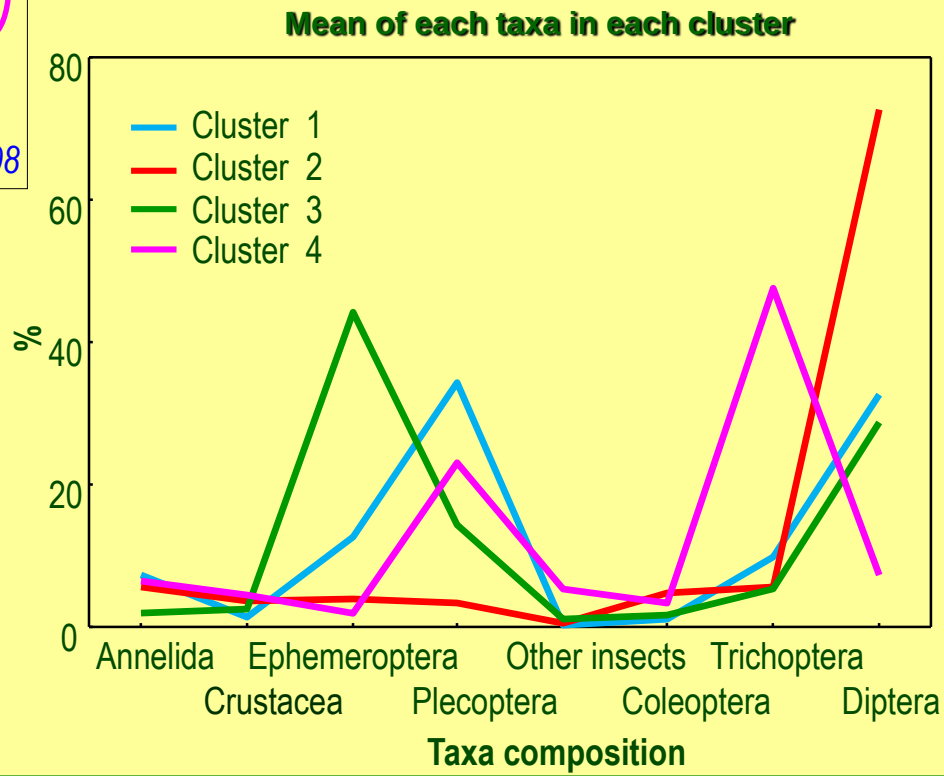
Results

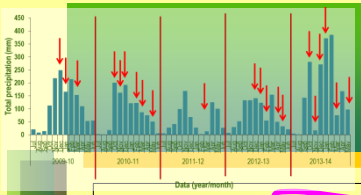


Taxonomic composition

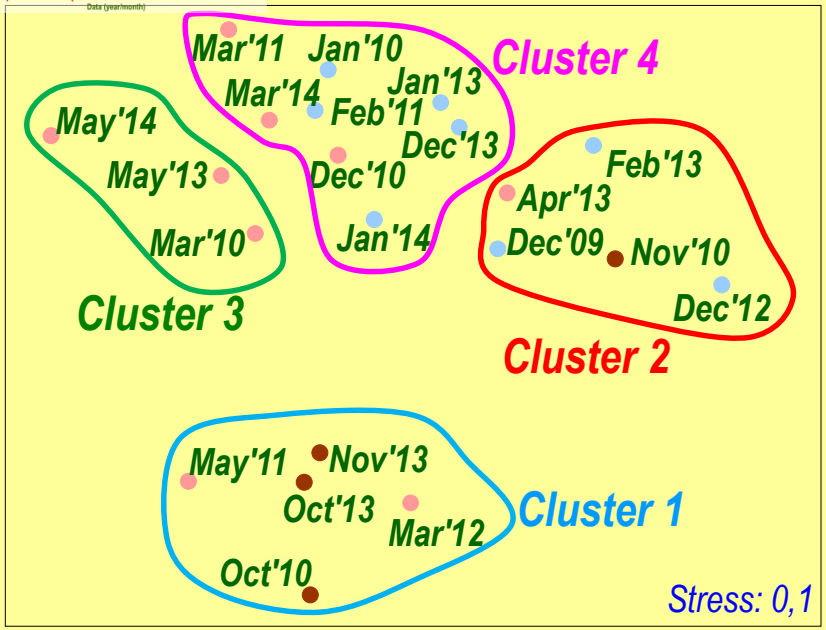
Teste ANOSIM: R_{global} = 0,848





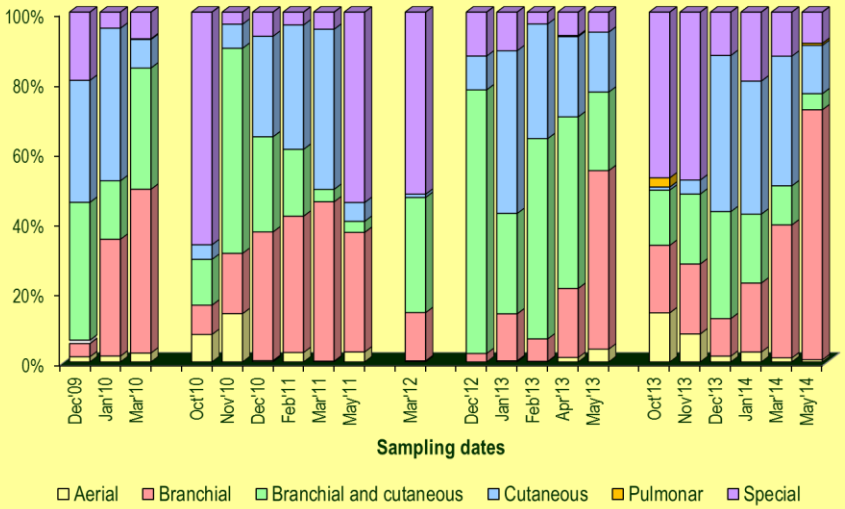


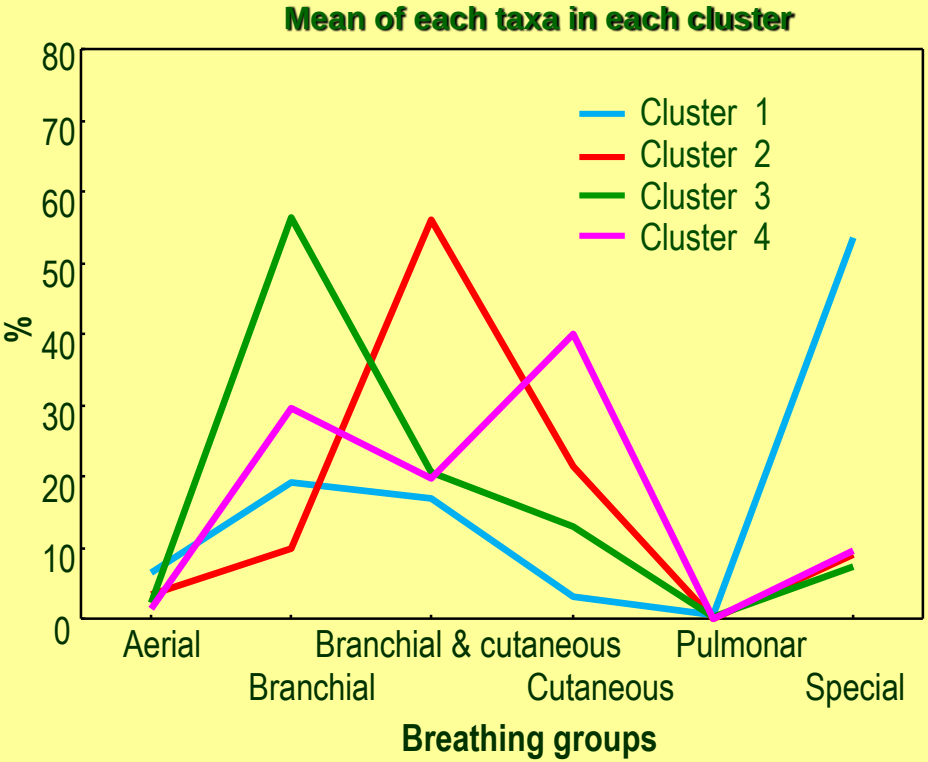
Results

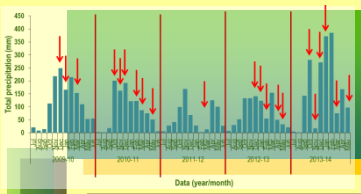


Breathing groups

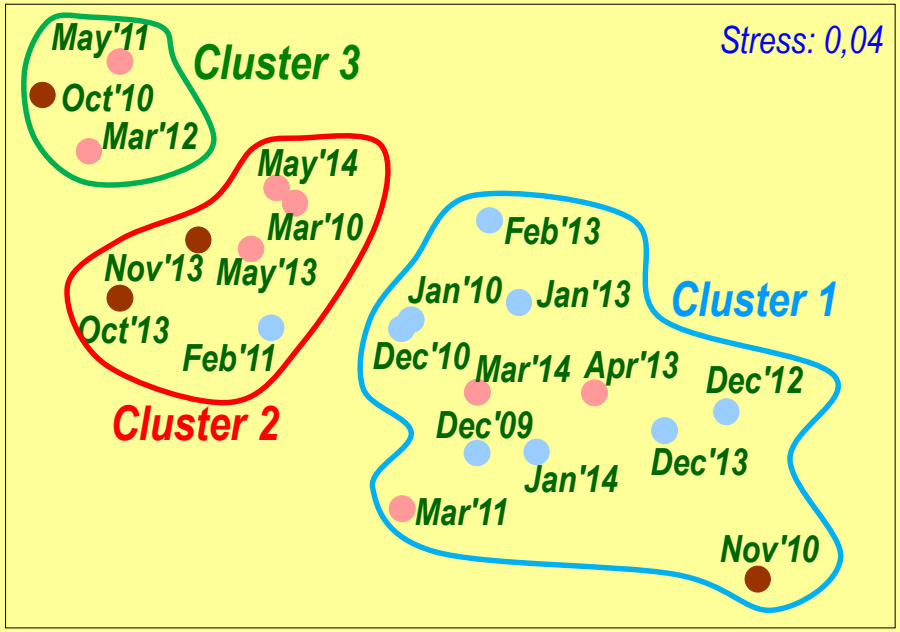
Teste ANOSIM: R_{global} = 0,907





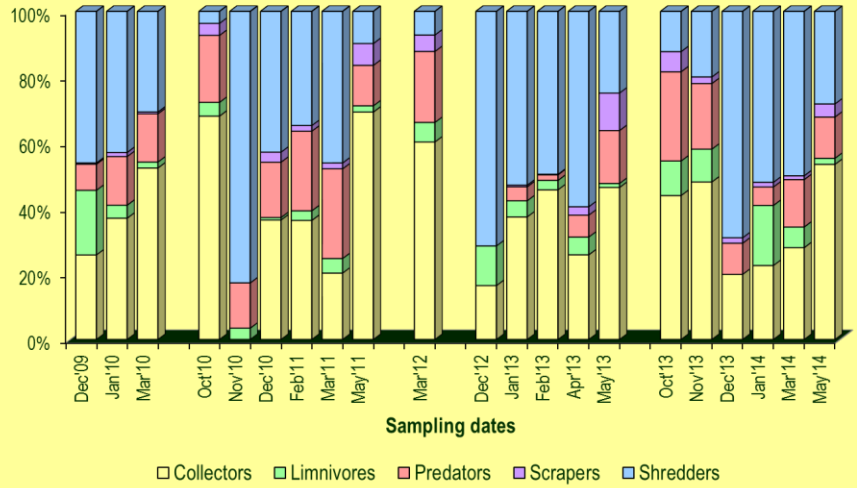


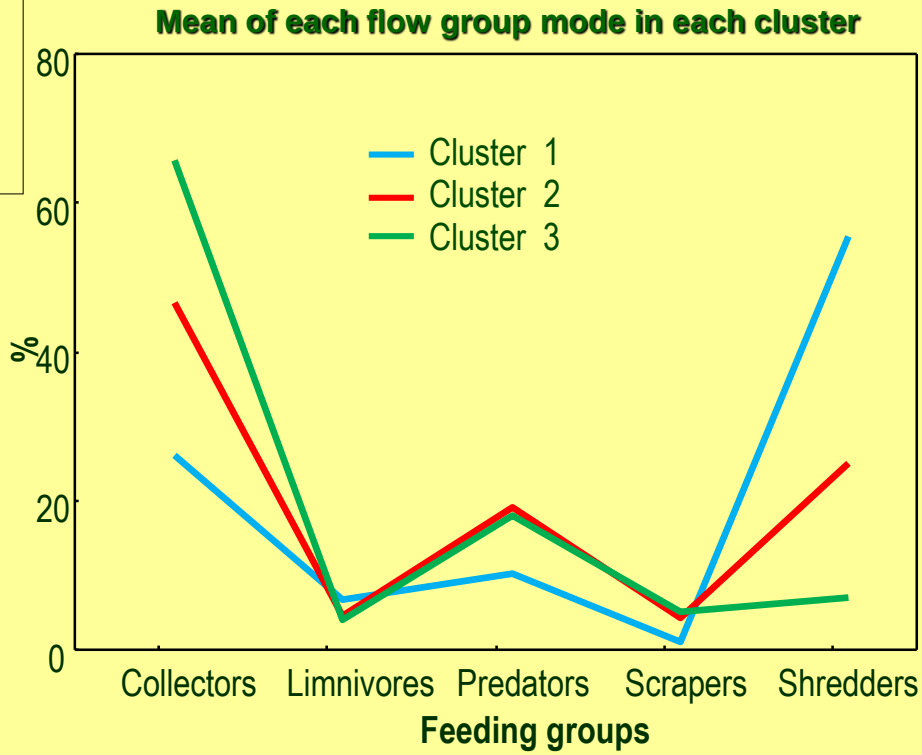
Results

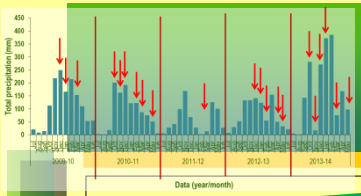


Feeding groups

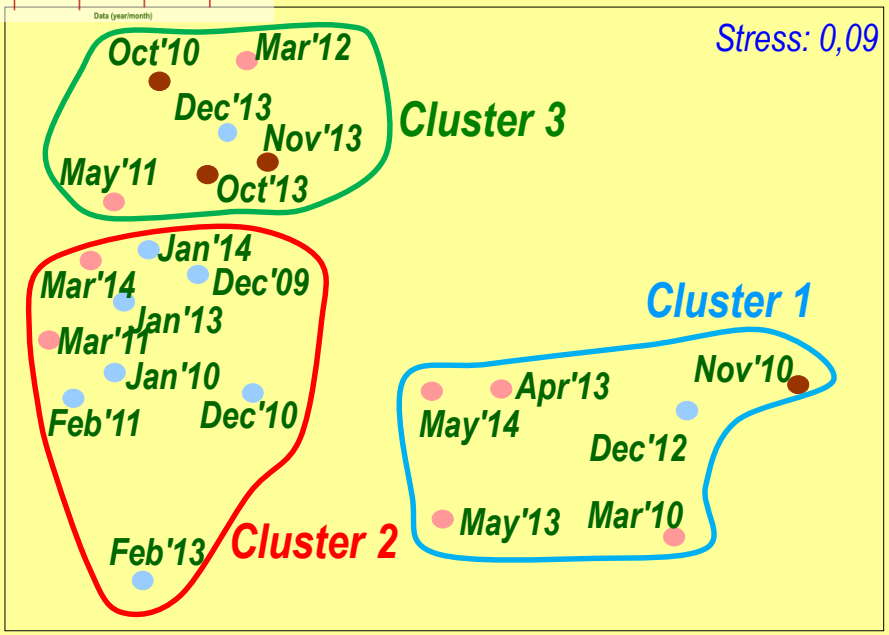
Teste ANOSIM: R_{global} = 0,697





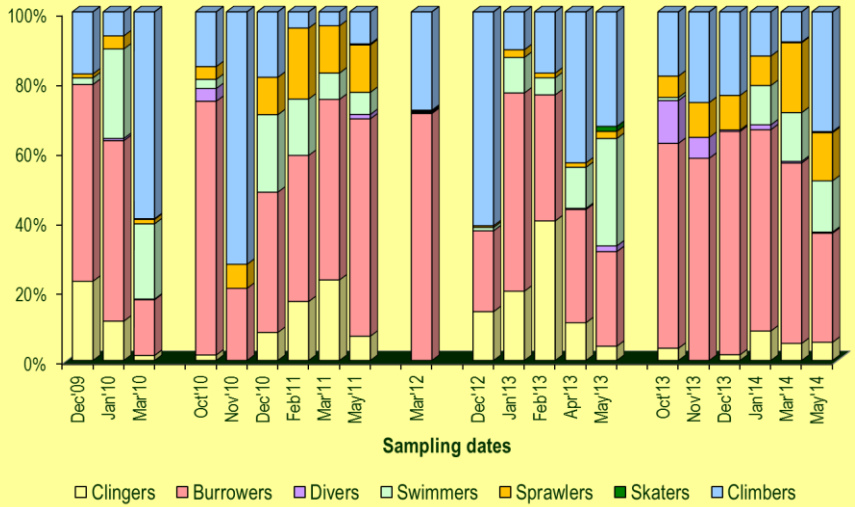


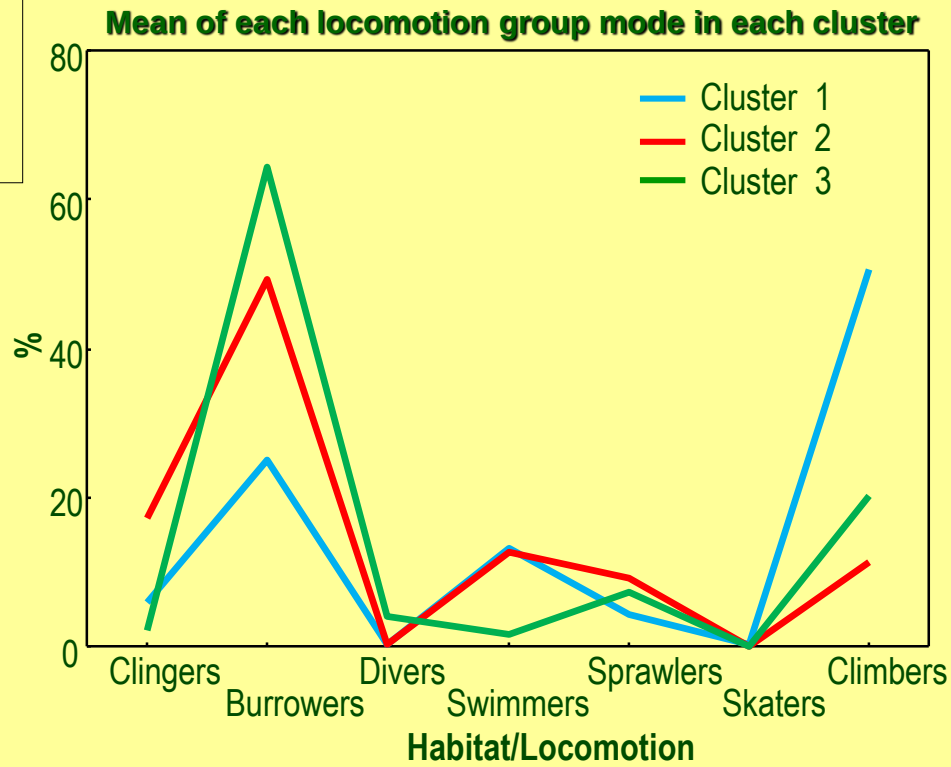
Results

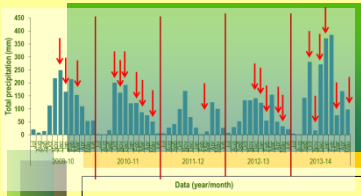


Locomotion/habitat

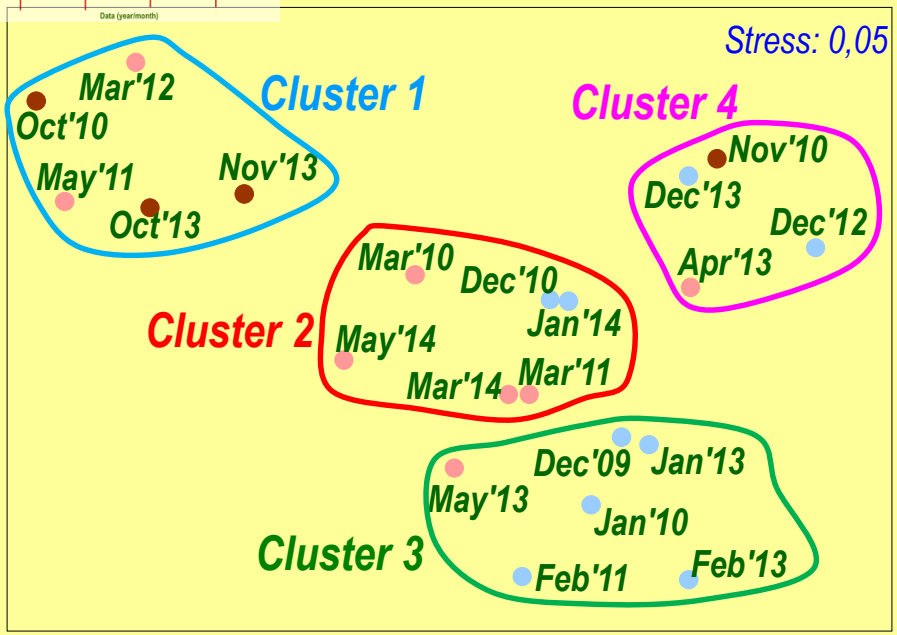
Teste ANOSIM: R_{global} = 0,740





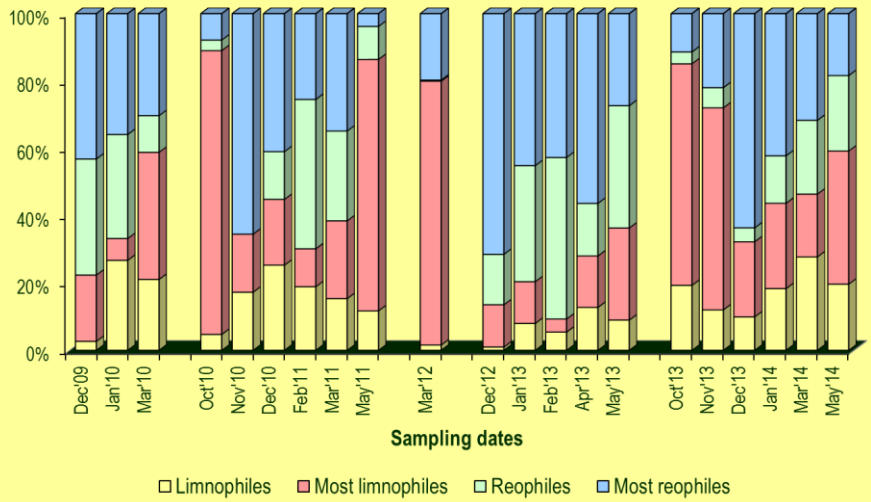


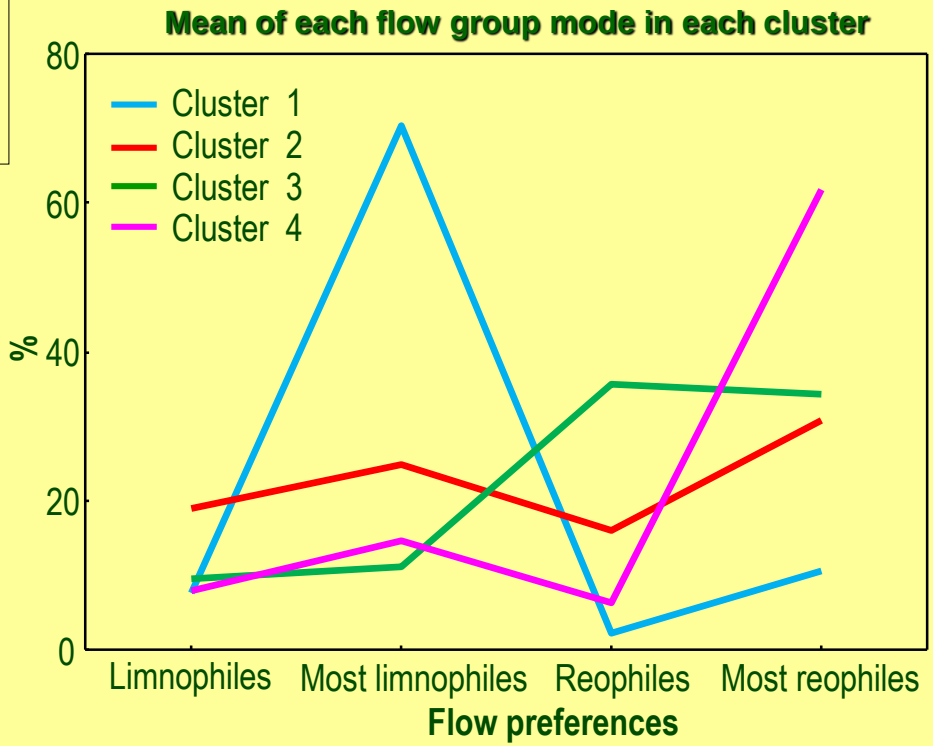
Results



Flow preferences

Teste ANOSIM: R_{global} = 0,891





Conclusions

- After the drought period (June to October), generally, there are a strong rainfall which cause a great increase in flow that tend to stabilize during the Winter and tend to decrease in the late Spring
- These conditions promote changes on the habitat structure:
  - a large increase in flow until the beginning of Spring, followed by a a slow decline by June
  - the development of a large amount of macrophytes in the channel in the spring

Conclusions

Taxa:
- Diptera>Trichoptera>Plecoptera

Breathing groups:
- Special breathers

Feeding groups:
- Collectors>shredders

Habitat/locomotion:
- Burrowers

Flow preferences:
- Most limnophiles

Taxa:
- Plecoptera>Diptera> Ephemeroptera>Trichoptera

Breathing groups:
- Cutaneous and branchial

Feeding groups:
- Shredders>collectors

Habitat/locomotion:
- Burrowers>swimmers>sprawlers

Flow preferences:
- reophiles and most reophiles

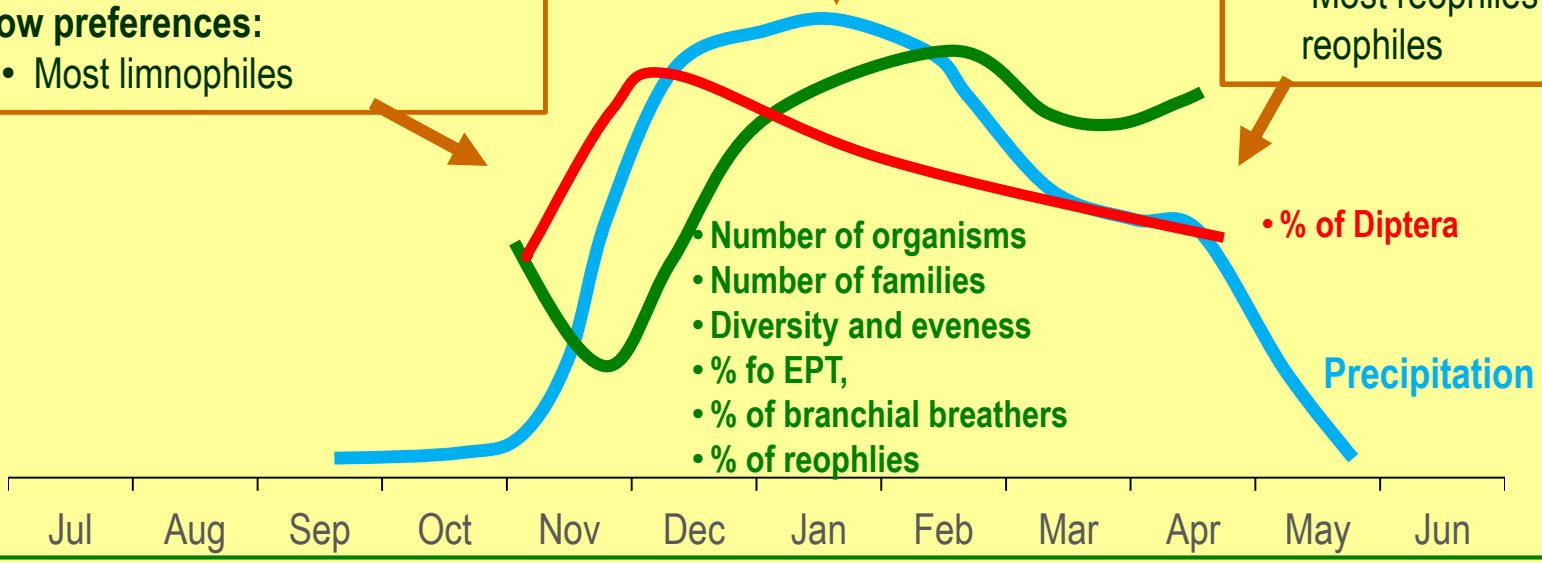
Taxa:
- Ephemeroptera>Diptera> Plecoptera>Trichoptera

Breathing groups:
- Branchial

Feeding groups:
- Collectors>shredders

Habitat/locomotion:
- Climbers>burrowers

Flow preferences:
- Most reophiles and reophiles



Thank You!