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# Seasonal

In addition to the spatially defined Typical Assemblages we also derive seasonally distinct assemblages for a subset of river types.

# Selection of river types

To avoid strong spatial signals in the seasonal typical assemblages (sTA) only those river types were considered in which samples were evenly distributed between seasons. In most cases, an even spatio-temporal distribution could only be achieved by omitting parts of the data (e.g. certain seasons or data sets). The maps for all stream types with all available seasons as well as the respective subsets that were used in the further analyses can be found in the GetRealDrive. An example for Invertebrates in RTXX is shown in figure X1

To visualize difference between the seasons we used Non metric multidimensional scaling (NMDS) on Jaccard dissimilarity matrices. The resulting plots are also available in the GetRealDrive. Figure X2 shows the NMDS plot for invertebrate samples in RTXX. Further, we evaluated whether the Jaccard distance between sites would be better explained by spatial distance or by season. To this end, we employed generalized dissimilarity modelling (GDM).

In GDMs, the response variable is the ecological distance between two sites (expressed in some a priori chosen distance metric). Smooth functions are fitted to the environmental data and the differences between the values of these functions at the two sites of interest are used as explanatory variables. The use of a generalized modelling framework account for bounded nature of dissimilarity metrics and the smooth functions allow for variation in the rate of compositional turnover along a gradient. The results for all GDMs can be found in the GetRealDrive, and that for RTXX is shown in figure X3.

The plot shows ….

Based on NMDS and GDM, we selected RT X and y for Invertebrates and y and x for diatoms. For these four river types sTA were derived in the same way as the non-seasonal TAs (see prior documents in GetRealDrive), with one notable difference. The option to become a member of the sTA by being specific (having a high

# We choose subsets that differed between seasons and analyzed them in the same fashion as others

# Pattern, overlap differences.

# Below are the seasonal typical assemblages

## 10 + 11

### Spring

Baetis, Limnephilidae

### Summer

Elmis, Gammarus, Limnius, Rhyacophila, Chironomidae, Limoniidae, Simuliidae

### Autumn

Baetis, Calopteryx, Ecdyonurus, Elmis, Ephemera, Esolus, Gammarus, Hydraena, Hydropsyche, Hydroptila, Leuctra, Limnius, Pisidium, Potamopyrgus, Rhyacophila, Riolus, Chironomidae

### Winter

Baetis, Leuctra, Rhithrogena, Chironomidae, Limnephilidae, Limoniidae

## 15 + 16

### Spring

Baetis, Athericidae, Chironomidae, Simuliidae

### Summer

Baetis, Chironomidae, Simuliidae

### Autumn

Baetis, Caenis, Ecdyonurus, Elmis, Epeorus, Gammarus, Hydraena, Hydropsyche, Isoperla, Leuctra, Nemoura, Protonemura, Rhithrogena, Rhyacophila, Chironomidae, Empididae

### Winter

Baetis, Leuctra, Chironomidae, Limoniidae

# Old shit

For stream type RT1 the summer TA has 15 taxa and the autumn TA 12. They share five taxa, so 29% of taxa remain typical throughout both seasons. Of these six taxa (Ancylus (Planorbidae), Baetis (Ephemeroptera), Chironomidae (Diptera), Gammarus (Gammaridae), Hydropsyche (Trichoptera), Potamopyrgus (Littorinimorpha)), two (Ancylus and Potymopyrgus) are also in the all-year TA.

For stream type RT10+11, the summer TA has 26 taxa and the autumn TA 19. They share 15 taxa, so 50% of taxa remain typical throughout both seasons. Of these 15 (Serratella ignita (Ephemeroptera), Baetis (Ephemeroptera), Chironomidae (Diptera), Ecdyonurus (Ephemeroptera), Elmis (Coleoptera: Elmidae), Ephemera (Ephemeroptera), Esolus (Coleoptera: Elmidae), Gammarus (Amphipoda: Gammaridae), Hydraena (Coleoptera: Hydraenidae), Hydropsyche (Trichoptera: Hydropsychidae), Hydroptila (Trichoptera: Hydroptilidae), Leuctra (Plecoptera: Leuctridae), Limnius (Coleoptera: Elmidae), Rhyacophila (Trichoptera: Rhycophilidae), Riolus (Coleoptera: Elmidae)) only one (Serratella ignita) is not part of the all-year TA.

For stream type RT15+16, the summer TA has 22 taxa and the autumn TA 20. 56% (n = 15) of taxa are present in both seasonal TAs. Of these 15, nine are also in the all year TA.

In Autumn all Gastropods are missing.

Table : Seasonal Typical Assemblages of Freshwater macro-invertebrates in River Type 15+16

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Taxon | Family | Order | Summer | Autumn | All-Year |
| Ancylus | Planorbidae |  |  |  |  |
| Baetis | Baetidae | Ephemeroptera |  |  |  |
| Caenis | Caenidae | Ephemeroptera |  |  |  |
| Chironomidae | Chironomidae | Diptera |  |  |  |
| Ecdyonurus | Heptageniidae | Ephemeroptera |  |  |  |
| Elmis | Elmidae | Coleoptera |  |  |  |
| Ephemera | Ephemeridae | Ephemeroptera |  |  |  |
| Esolus | Elmidae | Coleoptera |  |  |  |
| Gammarus | Gammaridae | Amphipoda |  |  |  |
| Hydraena | Hydraenidae | Coleoptera |  |  |  |
| Hydropsyche | Hydropsychidae | Trichoptera |  |  |  |
| Hydroptila | Hydroptilidae | Trichoptera |  |  |  |
| Isoperla | Perlodidae | Plecoptera |  |  |  |
| Leuctra | Leuctridae | Plecoptera |  |  |  |
| Limnephilidae | Limnephilidae | Trichoptera |  |  |  |
| Limnius | Elmidae | Coleoptera |  |  |  |
| Limoniidae | Tipulidae | Diptera |  |  |  |
| Odontocerum | Odontocearidae | Trichoptera |  |  |  |
| Oulimnius | Elmidae | Coleoptera |  |  |  |
| Pisidium | Sphaeriidae | Sphaeriida |  |  |  |
| Polycentropus | Polycentropodidae | Trichoptera |  |  |  |
| Radix | Lymnaeidae |  |  |  |  |
| Rhithrogena | Heptageniidae | Ephemeroptera |  |  |  |
| Rhyacophila | Rhycophilidae | Trichoptera |  |  |  |
| Riolus | Elmidae | Coleoptera |  |  |  |
| Sericostomatidae | Sericostomatidae | Trichoptera |  |  |  |
| Simuliidae | Simuliidae | Diptera |  |  |  |