PhD project:

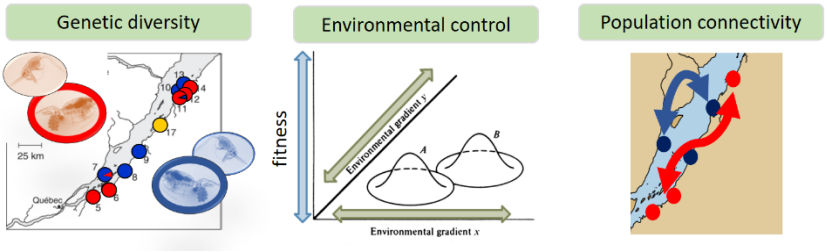
Zooplankton production and genetics in the changing St. Lawrence Estuary

Background:

Biological impacts of global warming are already under way and changes in plankton will have ecological consequences for higher trophic levels, such as fish. Thus, a pressing challenge is to increase our understanding how organisms and populations, especially at the base of the food web, will cope with these environmental changes. To increase the ability to predict future zooplankton communities and secondary production, we need to understand their adaptation potential. In estuarine zooplankton, that is already living in a highly dynamic environment, physiological adjustment is a common feature. Only a few species are able to thrive under the environmental constraints of the Estuarine Transition Zones (ETZs), thus zooplankton diversity is low. However, high productivity of these ETZs is mostly supported by a single key stone species. In the St. Lawrence Estuary the copepod species complex, *Eurytemora affinis*, is predominant. Interestingly, two genetically divergent sibling species exhibit distinct habitat preferences and/or divergence in life history traits. We highlighted the importance of the genetic diversity of the *E. affinis* complex in relation to its distribution and differential feeding strategies. However, the influence of *E. affinis* genetic diversity on a range of ecosystem functions, such as productivity, remains unknown.

Project:

The main objective is to disentangle the relationship between spatiotemporal production patterns, plasticity, genetic diversity and connectivity of populations of the sibling species complex *Eurytemora affinis*. In this project, we will determine how different eco-physiological tolerance of the two sibling species influence phenology and seasonal population dynamics, including phenotypic traits and biological processes such production and mortality in the mosaic of habitats along the environmental gradients of the estuarine transition zone. We will elucidate the connectivity (gene flow) among populations of the *E. affinis* species complex evaluating recent connectivity or isolation among these populations. Landscape genetics will couple the polymorphism with purely spatial and environmental features.



Perspective:

Anticipated results on spatial and temporal variability of secondary production of the *Eurytemora* complex across an environmental mosaic may help to assess the ecosystem status. Better understanding of the intraspecific diversity and plasticity is likely to have general ecological implications to the overall understanding of transition zones and will lead to a new and broadened mechanistic understanding of estuarine ecosystem functioning. These are important components of predicting the estuarine populations throughout the food web, especially in view of potential adaptation to the changing environment, due to anthropogenic pressure and climate change.

For additional information contact the supervisor:

In order for the selected individual to develop his or her full academic potential, the supervisory team wishes to provide an equitable, diverse, and inclusive environment that supports the originality of research work and the personalization of ideas.

Dr. Gesche Winkler, professor in zooplankton ecology, gesche_winkler@uqar.ca