RICLIC WARM Regional Impact of Climatic Change in Lombardy Water Resources: Modelling and applications

ARE POPs A THREAT TO ALPINE AQUATIC ECOSYSTEMS? Preliminary results

Bizzotto Elisa, Villa Sara, Vaj Claudia, Vighi Marco
University of Milano-Bicocca, Milan, Italy

SETAC

SETAC Europe 2007 | Porto • PORTUGAL

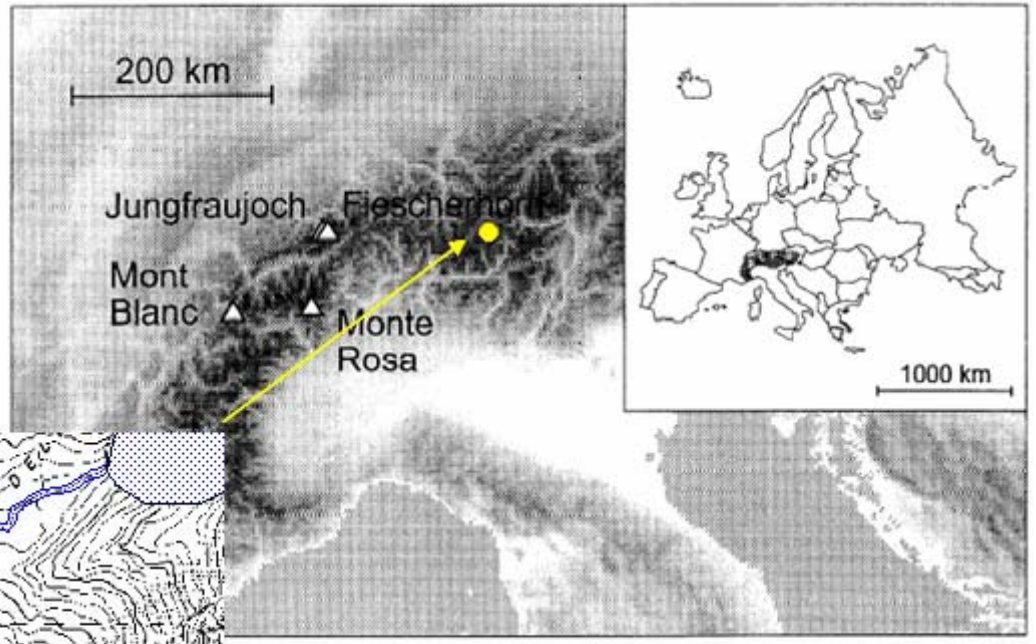
The potential impact of peak OCs fluxes on glacial fed aquatic ecosystems suggests a need for better understanding the magnitude and temporal variability of OC concentrations in these environments.

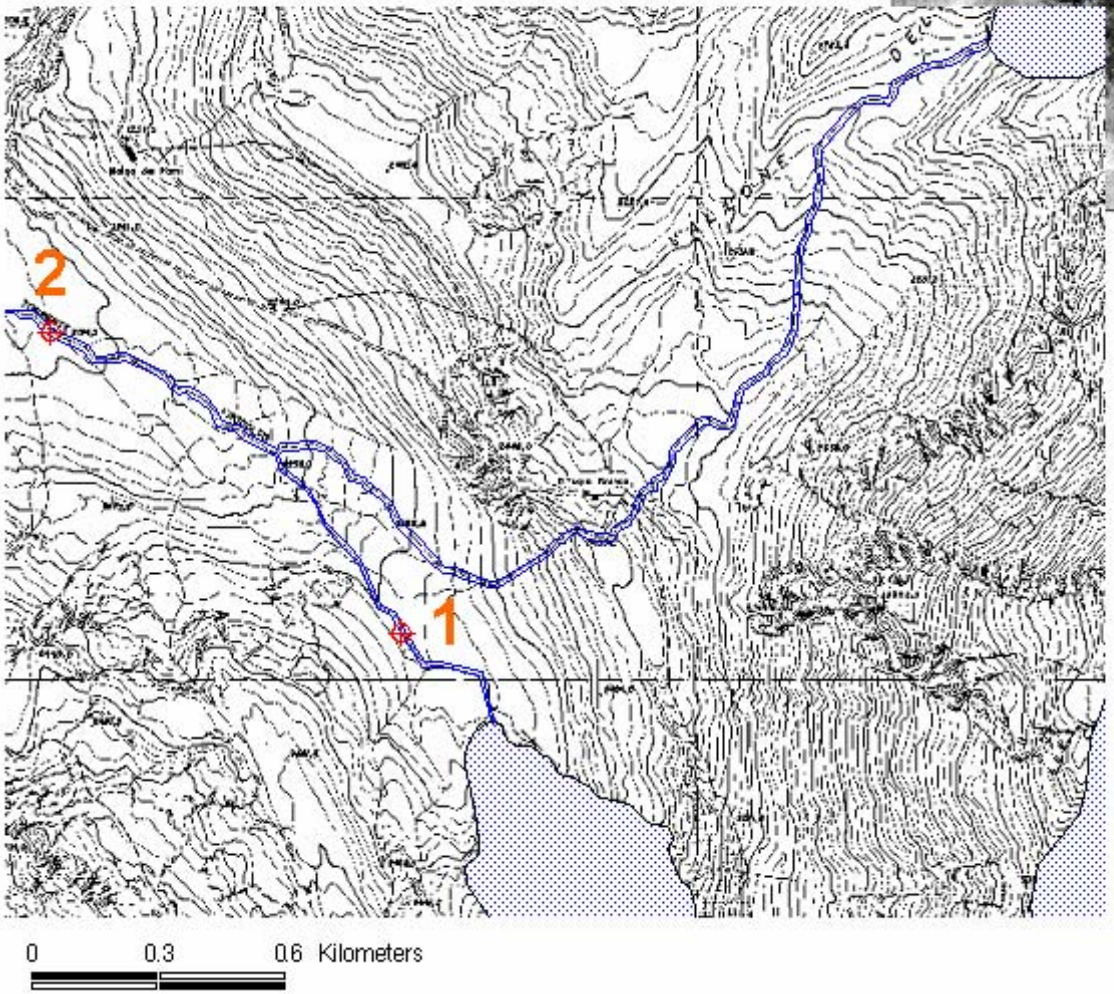
Characterization of a selection of OCs in glacial fed river (kryal) and its community

Assessment of OC bioaccumulation and biomagnification potential in the macroinvertebrate community

Sampling Site

Valfurva Valley
(Stelvio National Park)

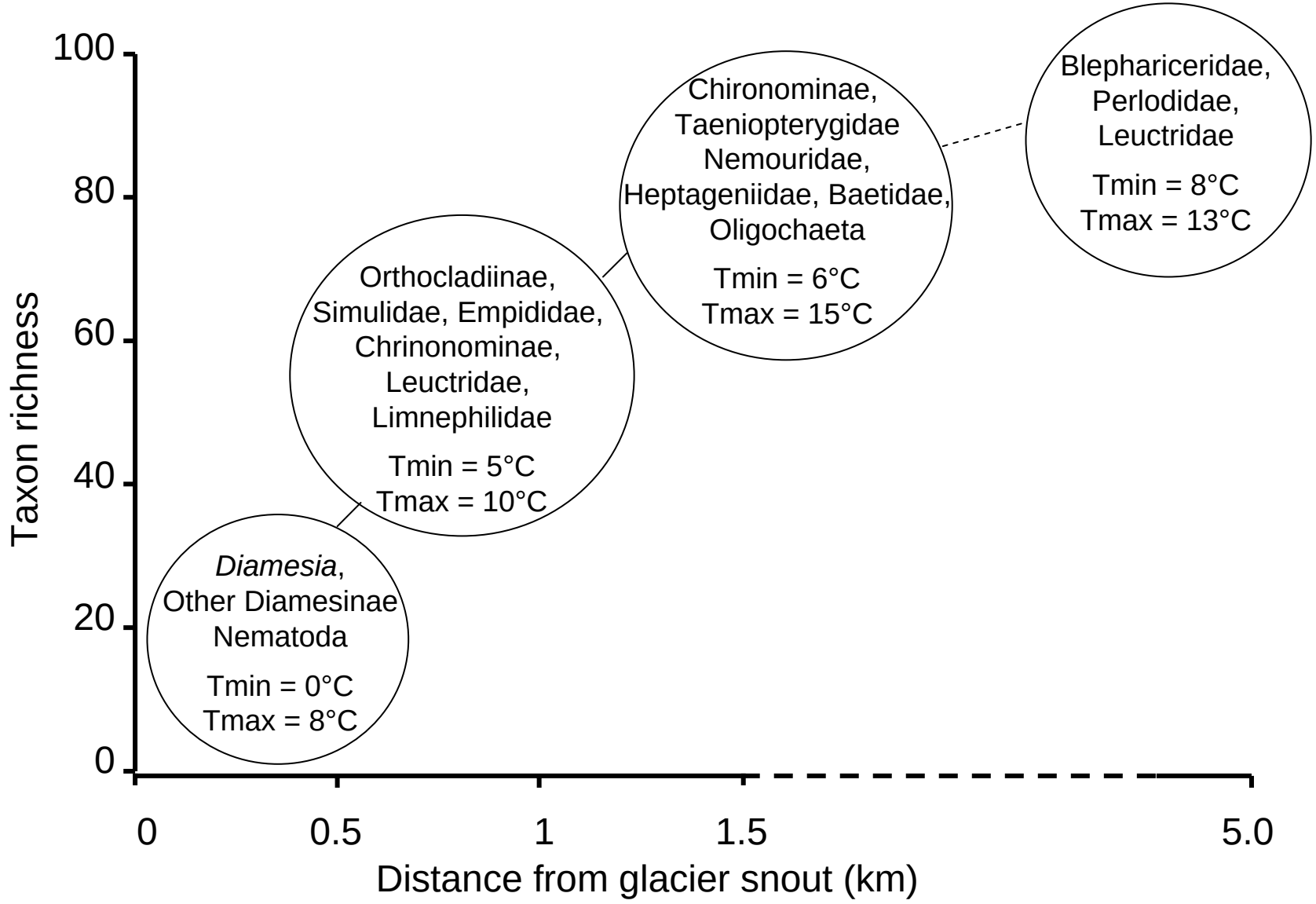




Legend

- Sampling points
- Glaciers
- Glacial Streams

Conceptual model to predict the gradient of zoobenthic communities in rivers downstream of glacial margins



Functional Feeding Groups

Collector-gatherers

Collects (gathers) or uses a filter mechanism to collect primarily FPOM (detritus) and/or small organisms as food sources

Scrapers-grazers

Scrapes and grazes Biofilm, including Diatoms and Cyanobacteria off exposed surfaces as a food source

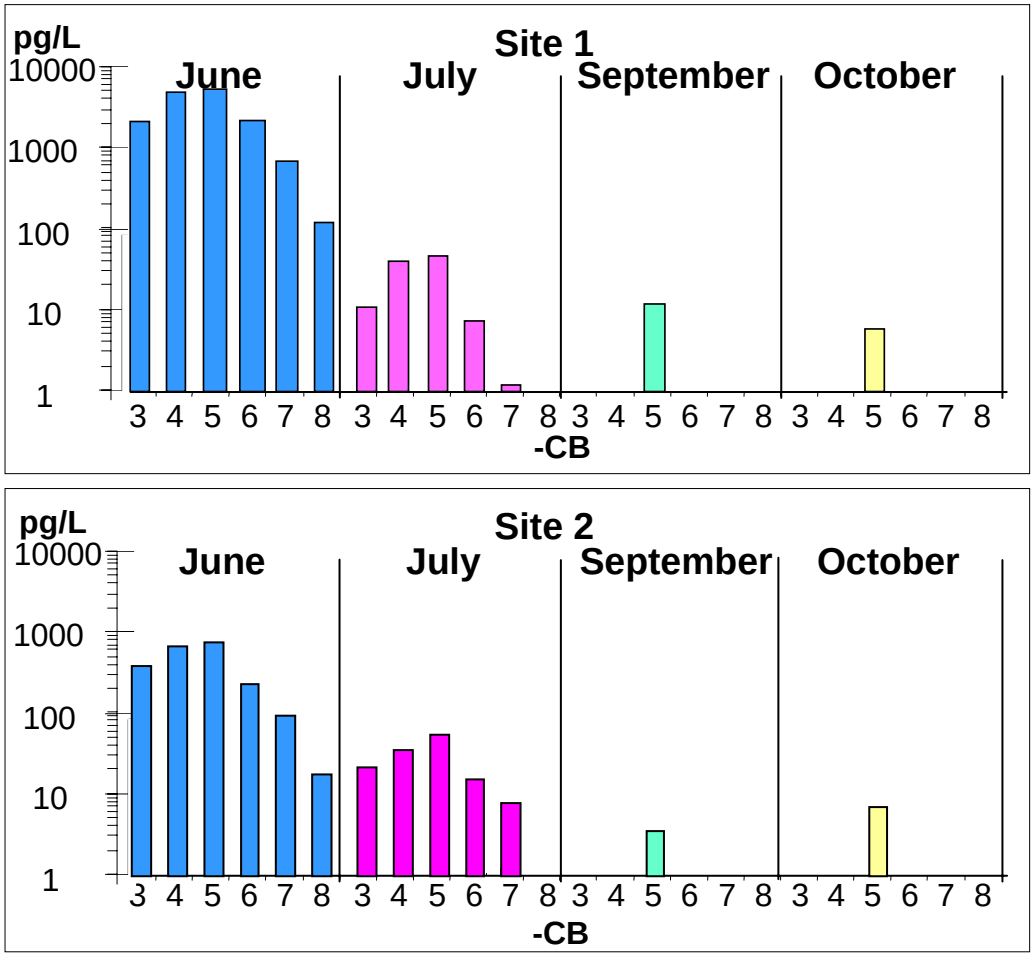
Predators

Attacks and engulfs other insects and macroinvertebrates as a food source

Shredders

Shreds and chews CPOM (e.g., leaves, bark, etc.) as a food source

Magnitude and temporal variability of PCB concentrations



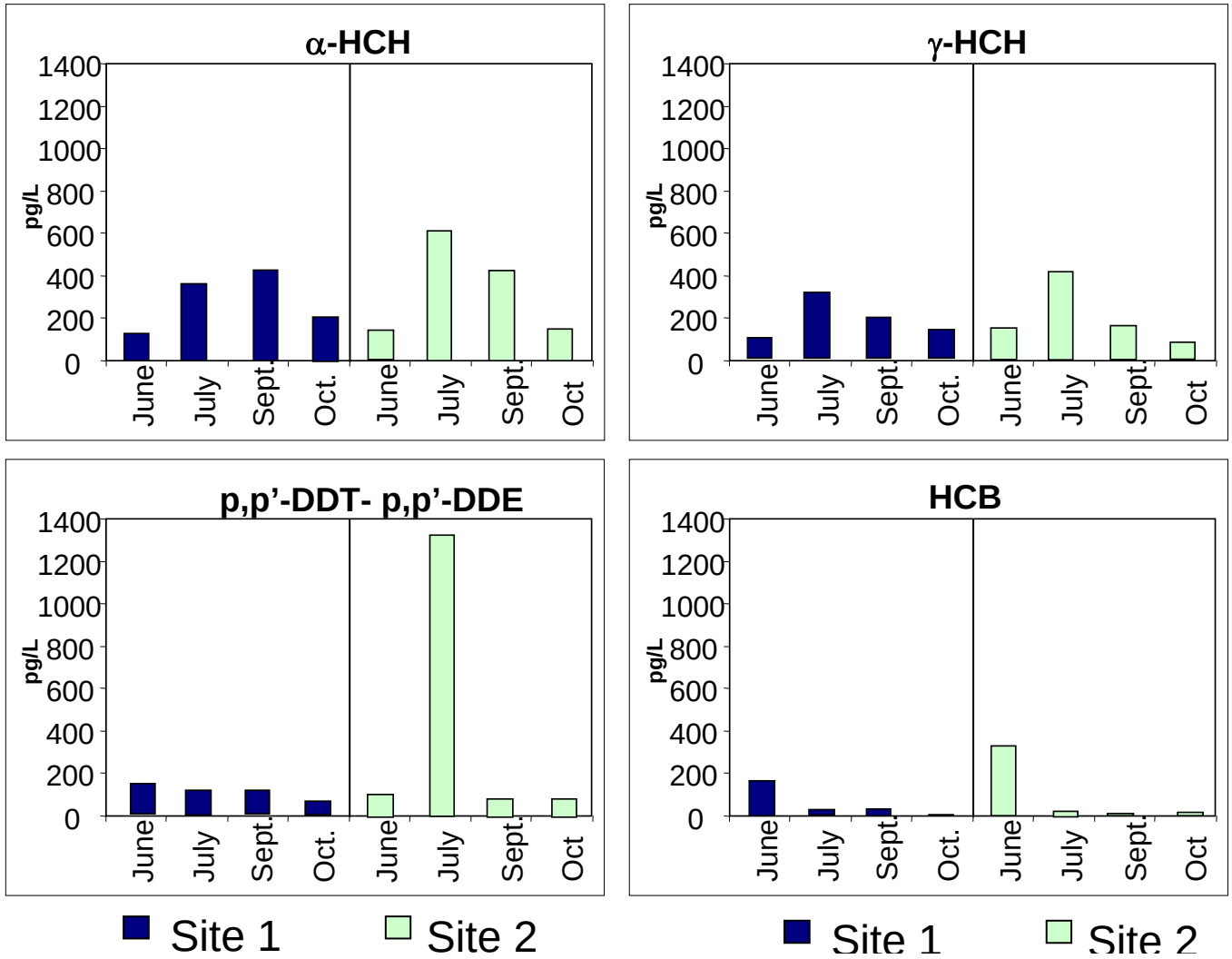
Small difference between the sites, except in June.

Very high level in June.

Typical fingerprint of local contamination, as reported for PCB contamination in snow and ice of Stelvio Glacier (Villa et al., 2001)

Hypothesis: snow was making significant contributions to runoff

Magnitude and temporal variability of OC concentrations



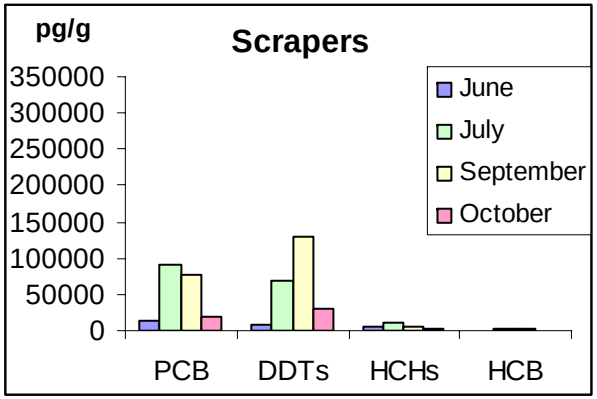
Small difference between the sites.

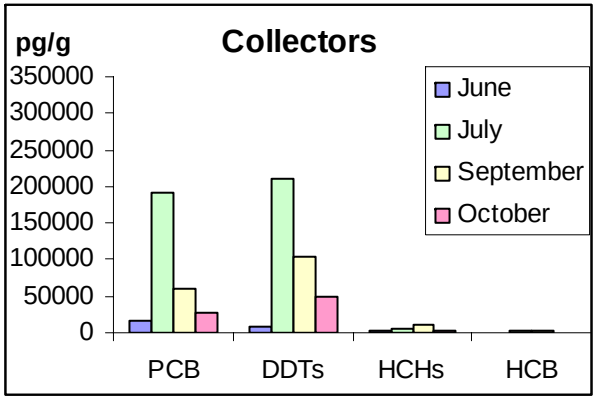
Very high level in July.

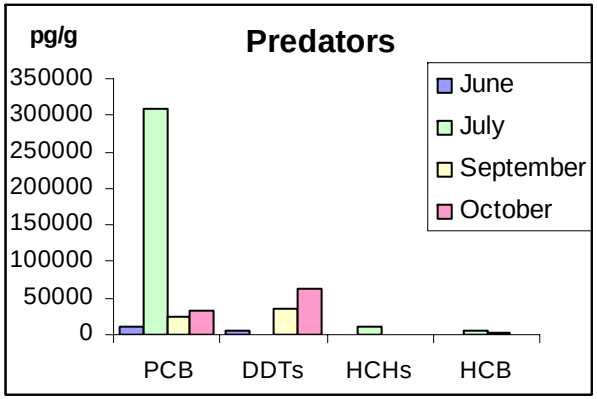
Typical fingerprint of LRAT

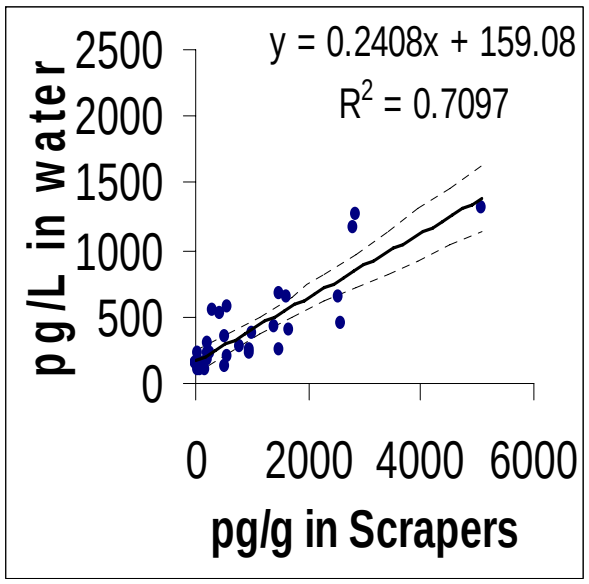
Glacier ice and firn had higher OC concentrations than the winter snowpack and these meltwaters were making significant contributions to runoff volumes.

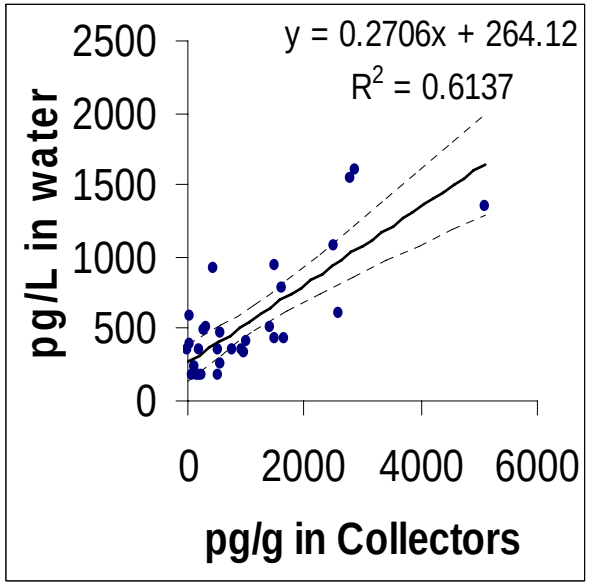
Magnitude and temporal variability of OC concentrations in macroinvertebrate community

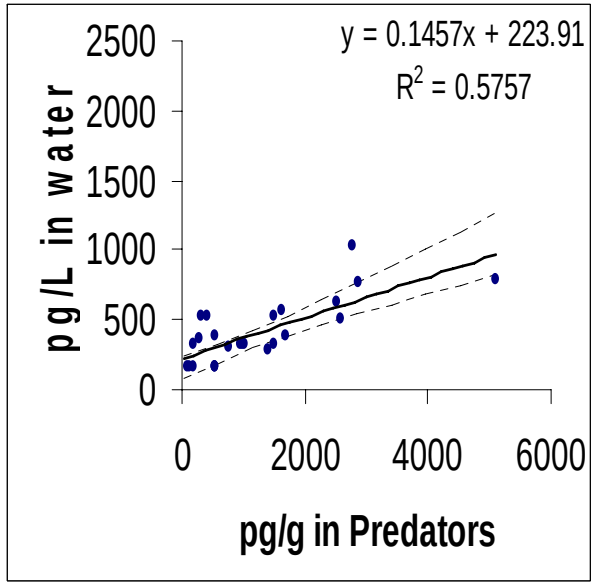




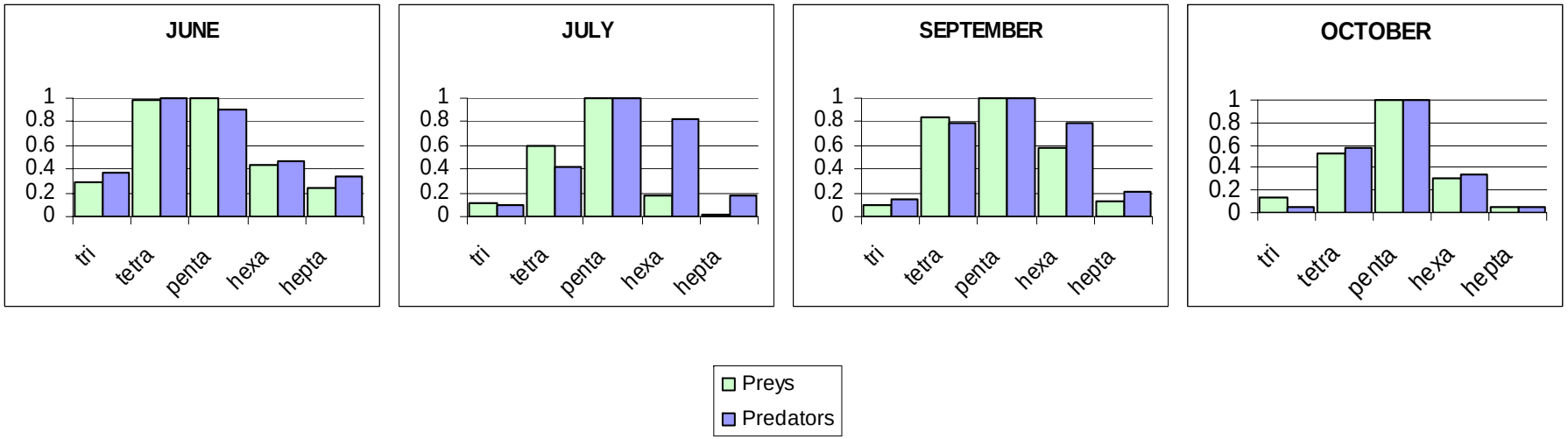








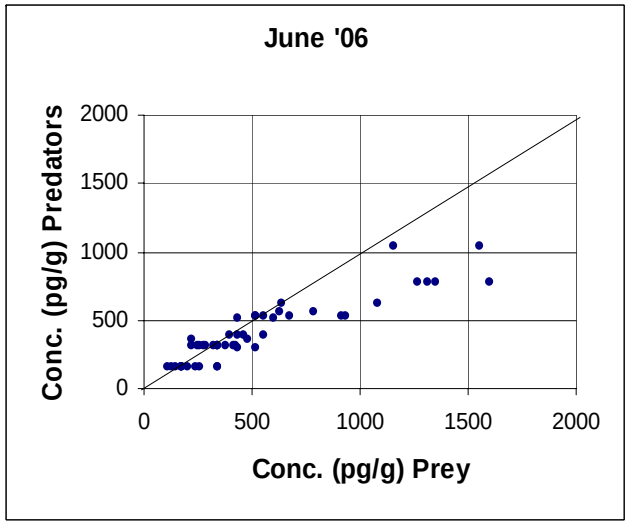
PCB fingerprint in Preys and Predators

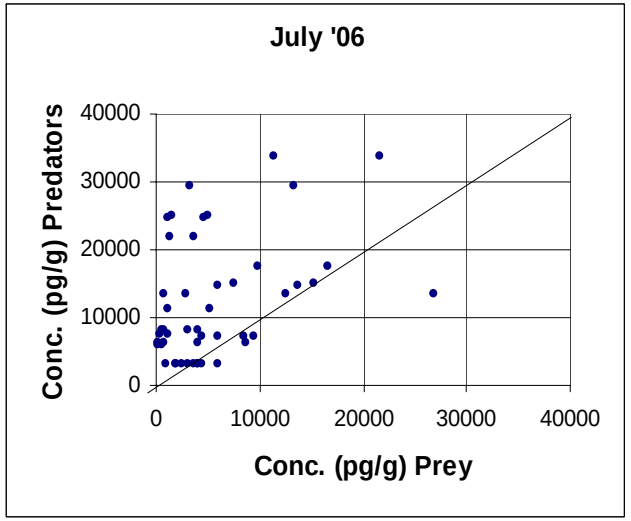


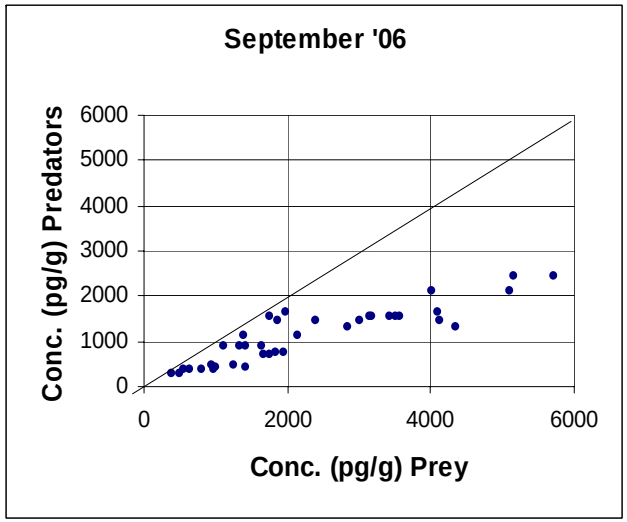
Preys: PCB fingerprint in Preys (scrapers and collectors) is similar to fingerprint in water

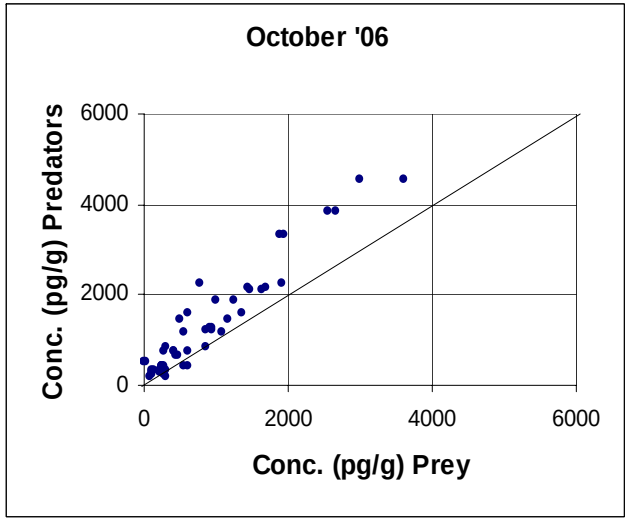
Predators: enrichment of the heavier congeners (hexa and hepta-CB)

Dietary enrichment





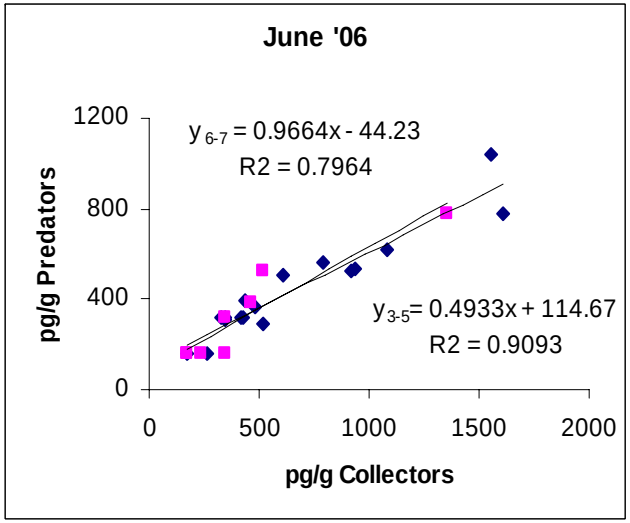


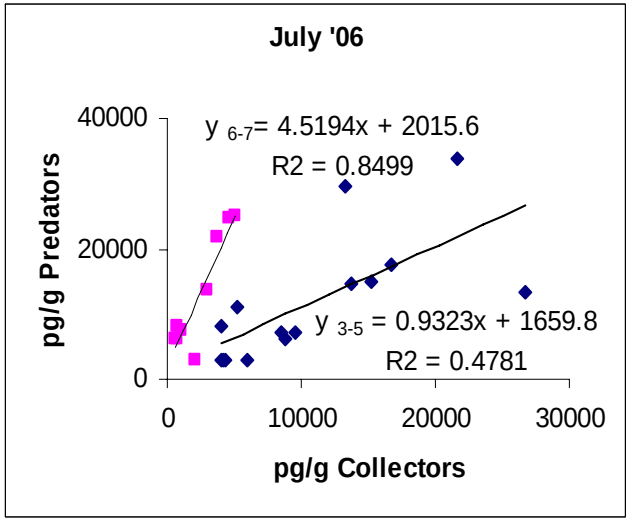


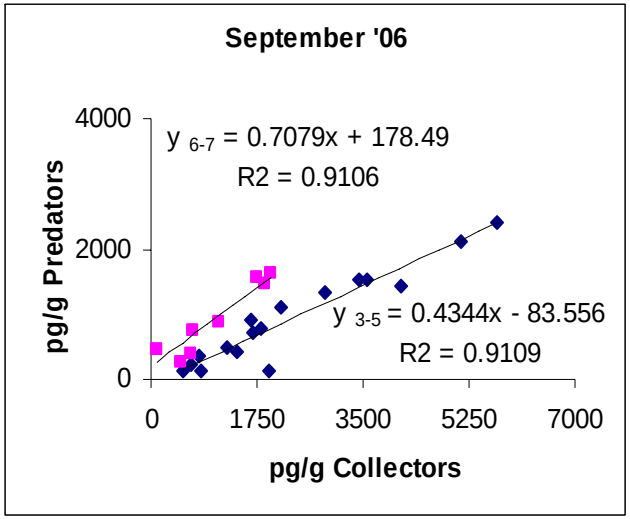
Conc. in Predators < Prey

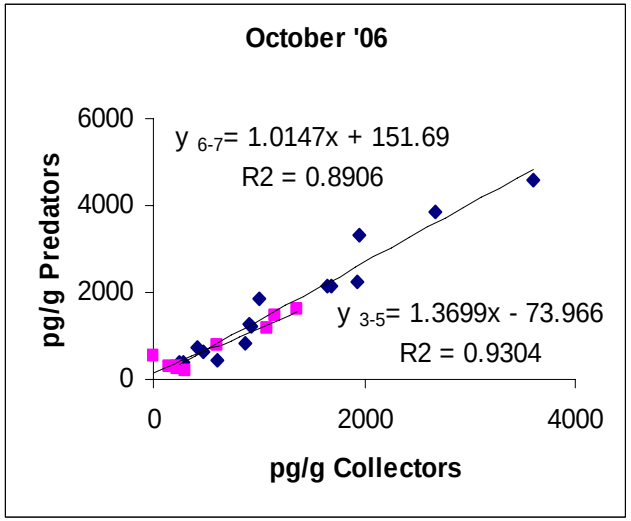
Conc. in Predators > Prey

Physical-chemical properties influences biomagnification





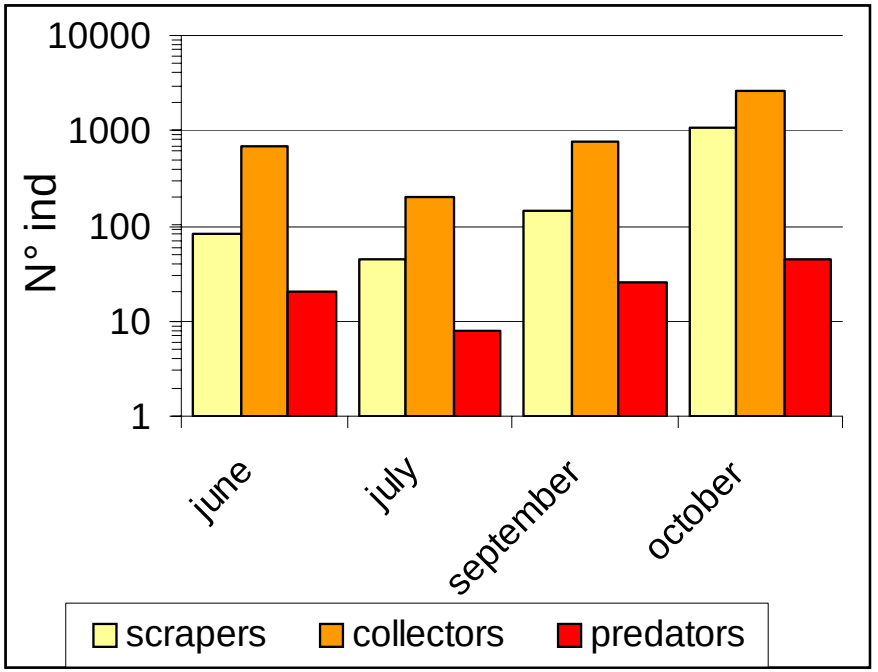




Influence of Life cycle

The structure of macrobenthonic community showed differences occurred in the mean abundance of Diptera (Chironomidae and Simuliidae), Ephemeroptera and Plecoptera.

Most aquatic insects in kryal ecosistem are univoltine. Life cycle is completed in about 1 year, so that these species have only 1 generation per year.



Conclusion

High-altitude catchments are likely subject to higher pulses of OC contaminants in runoff in spring and in summer as a result of higher snowfall rate and glacial melting.

Concern for the “health” for kryal community due to bioaccumulation and biomagnification phenomenon that occur in a very short term.