Table S3. An overview and comparison of sampling efforts and results between benthic and exuviae methodology.

| Study | Sampling method | Species recorded | Efficiency | Time Required | Study conclusions |
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| Ferrington, L.C.; Blackwood, M.A.; Wright, C.A.; Crisp, N.H.; Kavanaugh, J.L.; Schmidt, F.J. A Protocol for Using Surface-Floating Pupal Exuviae of Chironomidae for Rapid Bioassessment of Changing Water Quality. *International Association of Hydrological Sciences: Wien, Austria* **1991**, 181-190. ISBN 0947571086. | Hand net sampling or dip-net sampling at 25 sampling sites on two streams | | At sample sites with species richness of 2-5 species the average efficiency was 65%; with 6-10 species was 52.2%, 11-14 species was 47% and 15-16 species was 45.7% | Aver. sorting 121.5 min; aver. identification time 68.6 mins | Pupal exuviae collections can improve benthic samples in studies examining biological responses to changes in water quality. They may also serve as a substitute for benthic sampling in large-scale analyses that require repeated sampling over extended periods. |
| | Pupal exuviae sampling method at 25 sampling sites on two streams | | At sample sites with species richness of 2-5 species the average efficiency was 70%; with 6-10 species was 79.4%, 11-14 species was 91.8% and 15-16 species was 97.8% | Average to sort and identify 52.7 mins | |
| Ruse, L.P. Chironomid community structure deducted from larvae and pupal exuviae of a chalk stream. *Hydrobiologia* **1995**, *315*, 135-142. | Core sample (surface area 95 $cm^2$) of gravel on a depth of 5 cm, sampled at 8 positions along a 20 m long transect | 24293 larvae individuals with 67 taxa identified at eight positions | | | Approx. four times as many taxa were collected with pupal exuviae method. Exuviae collections likely provide more comprehensive representation than larval species proportions across all habitats in the study area. |
| | Pupal exuviae sampling method in 10 m transect among vegetation | 3325 pupal exuviae individuals with 78 taxa identified in six drift samples | | | |
| Raunio, J.; Ihaksi, T.; Haapala, A.; Muotka, T. Within- and among- lake variation in benthic | Profundal grab sample at six lakes | 21 taxa of macroinvertebrates* in 48 samples | | | Chironomidae diversity in CPET samples was higher than in sediment profundal |

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| macroinvertebrate communities-comparison of profundal grab sampling and the chironomid pupal exuvial technique. *Journal of the North American Benthological Society* **2007**, *26*(4), 708-718. DOI: http://dx.doi.org/10.1899/06-125.1 | Pupal exuviae sampling method at six lakes with two samples at each lake | 27 Chironomidae taxa in 12 samples | | samples; method appeared more efficient than grab sampling at detecting profundal taxa with minimal extra sampling and handling costs. Pupal exuviae species data also better reflected the ecological status of small mesohumic lakes, and it should be considered as an alternative or supplementary assessment tool. |
| Sealock, A.W.; Ferrington L.C. Sampling efficiency of Chironomidae (Diptera) across disturbance gradients. *Bol. Mus. Mun, Funchal.* **2008**, *13*, 58-92. ISBN 0870-3876 | Dip-net sample at eight sample sites with subsamples depending on microhabitat | 51 Chironomidae taxa | | Sampling on one occasion on some sites, the dip-net method was more effective, but on disturbed sites, there was no difference. For sampling exuviae the most efficient was to collect them monthly. The CPET method collected twice as many genera as the dip-net method. |
| | Pupal exuviae sampling method monthly | 71 Chironomidae taxa and 129 species | | |
| Raunio, J.; Anttila-Huhtinen, M. Sample size determination for soft-bottom sampling in large rivers and comparison with the | Grab sample from depth to 10 m in soft sediment | In total 69 benthic taxa* (Oligochaeta and Chironomidae) from 40 samples | | Nearly twice as many taxa were identified using CPET; most "grab samples species" were also present in the CPET |

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| chironomid pupal exuvial technique (CPET). *River research and application* **2008**, *24*, 835-843. | | | | | samples, in less number of samples, suggesting that the CPET might be more economical for biomonitoring of large rivers. The CPET data appeared to provide a better reflection of the river's trophic status, indicating that benthic macroinvertebrates in deep depositional areas might underestimate the ecological status of large rivers. |
| | Pupal exuviae sampling method | 111 Chironomidae taxa in 15 samples | | | |
| Anderson, A.M.; Ferrington, L.C. Time-efficiency of sorting Chironomidae surface-floating pupal exuviae samples from Urban Trout Streams in Northeast Minnesota, USA. *Fauna norvegica* **2012**, *31*, 19-23. DOI: 10.5324/fn.v31i0.1380. | Dip-net samples (standard multi habitat procedure) at 17 sample sites at 12 streams resulting in 34 samples | | | Aver. sorting time 32.7 mins | The results show that sorting CPET samples required about 70% less time than sorting dip-net samples. This makes the CPET method more time-efficient compared to traditional dip-net techniques in trout streams with diverse catchment characteristics. |
| | Pupal exuviae sampling method at 17 sample sites at 12 streams resulting in 68 samples | | | Aver. Sorting time 21.7 mins | |
| Ferrington, L.C.; Coffman, W.P. Differential efficiencies of dip-net sampling versus sampling surface-floating pupal exuviae in a biodiversity survey of Chironomidae. *Chironomus* **2014**, *27*, 31-40. | Dip-net samples at five sample sites | 7329 individuals of Chironomidae larvae; 49 taxa and 77 species | 66.2 % of identified taxa, 57.5% of identified species | | CPET method proven to be more effective at detecting genera and species in comparison to dip-net samples. CPET also was slightly more effective at detecting phoretic taxa. |
| | Pupal exuviae sampling method sampled monthly | 8508 Chironomidae pupal exuviae; 72 taxa and 128 species | 97.3 of identified taxa, 95.5% of identified species | | |

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| Kranzfelder, P.; Ferrington, L.C. Characterization of Chironomidae (Diptera) surface-floating pupal exuviae sample sort time from costal tropical aquatic systems. *Environ. Monit. Assess.* **2015**, *187*, 70. DOI 10.1007/s10661-015-4313-0 | Dip-net samples | 27 individuals of Chironomidae larvae | | - | CPET method should be a preferred replacement to dip-net sampling for biomonitoring in estuarine environments. This study will enhance planning and budgeting for future field sampling designs by providing guidelines for biomonitoring programs using the CPET method. |
| | Pupal exuviae sampling method on four sampling sites on seven consecutive days resulting in 56 samples | 44 taxa and 98 species of Chironomidae | | Sorting time of small samples on average 69.3 min; moderate samples 85.6 mins; large samples 153.5 mins | |

*no information on Chironomidae separately