**Assessment factors for toxicity based risk assessment in the presence of non-exchangeable species.**

Graeme L. Hickey[1], Peter S. Craig[2] and Tom Aldenberg[1]

[1] Department of Mathematical Sciences, Durham University, UK
[2] National Institute for Public Health and the Environment, RIVM, The Netherlands

Ecotoxicological risk assessments for regulatory purposes are currently being performed deterministically. Proposals of probabilistic based methods are typically founded on the premise of a species sensitivity distribution (SSD). SSDs typically have a large number of assumptions attached, many of which cannot be realistically tested. However, one of the assumptions is that every species group is statistically exchangeable with every other species in the assemblage. With this assumption one advocates that toxicity data derived from well studied dose–response theory for each species group are a realisations from the same sensitivity distribution (relative to some endpoint) *a priori*. It is however, well observed that certain standard dossier species, such as the Rainbow trout, are typically non-exchangeable; for instance see [EFSA 2005]. One is often interested in estimating the lower-tail percentiles of the SSD, typically the 5th percentile. Moreover, it is desirable for risk managers to have simple 'black-box' functions to estimate these percentiles which take into account the large uncertainty arising from small data samples. This is usually done by looking for decision rules which are a function of the sample mean, sample standard deviation, and an assessment (safety/extrapolation) factor. We propose a different model which accounts for this non-exchangeability and hence derive a new class of assessment factors which can be applied to adjusted sample means and standard deviations. The new parameters we introduce, which we expect to be reusable, are estimated from a large non-public database held by the Dutch RIVM.

## References

[EFSA 2005] European Food Safety Authority Panel on Plant Health, Plant Protection Products and their Residues, 2005. Opinion of the Scientific Panel on Plant Health, Plant Protection Products and their Residues on a Request from EFSA Related to the Assessment of the Acute and Chronic Risk to Aquatic Organisms with Regard to the Possibility of Lowering the Uncertainty Factor if Additional Species were Tested. *The EFSA Journal*. **301**, 1–45.