Species Non-Exchangeability for Ecotoxicological Risk Assessment

GL Hickey, PS Craig, AD Hart, R Luttik

Preamble

- Statistical concept of Species Sensitivity Distributions (SSDs) is used frequently.

- Assumption: data are a random sample from the same SSD - realistic?
What is non-exchangeability?

- If a particular species regularly occurs in one half of an SSD (across many substances) then the species is said to be **non-exchangeable** with the other tested species.

- Idea has been floating around for some time (c.f. ‘sensitive species’ adoption); formal investigation in EFSA (2006) report.

- Statistical analysis supports hypothesis that Rainbow trout, a standard dossier species, is **non-exchangeable** (to other fish species). [~ 72% have EC$_{50}$ < median EC$_{50}$ of fish]
What to do with this knowledge?

- Rainbow trout is typically sensitive = greater impact (increases conservatism) on estimation of $HC_p$.
- Do we want to be: precautionary or obtain actual level of risk?
- Exploit information on non-exchangeable species from large relevant databases (e.g. RIVM fish database).
- Can adapt current $HC_p$-estimation methods to get mathematically tractable estimates which account for non-exchangeability of a species.