

COMPARISON OF TEMPERATE AND TOPICAL SALTWATER SPECIES' ACUTE SENSITIVITIES DISTRIBUTIONS TO CHEMICALS: IMPLICATION FOR DERIVING SAFE EXTRAPOLATION FACTOR

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Due to a lack of saltwater toxicity data in tropical regions, toxicity data generated from temperate or cold water species endemic to North America and Europe are often adopted to derive water quality guidelines (WQG) for protecting tropical marine ecosystems. Given the differences in species composition and environmental attributes between tropical and temperate saltwater ecosystems, there are conceivable uncertainties in such 'temperate-to-tropic' extrapolations. This study aimed to compare temperate and tropical saltwater species' acute sensitivity to 11 chemicals through a comprehensive meta-analysis, by comparing species sensitivity distributions (SSDs) between the two groups. A 10 percentile hazardous concentration (HC10) is derived from each SSD, and then a temperate-to-tropic HC10 ratio is computed for each chemical. Our results demonstrate that temperate and tropical saltwater species display significantly different sensitivities towards all test chemicals except cadmium. Temperate species are more sensitive to un-ionised ammonia, chromium, lead, nickel and tributyltin, whereas tropical species are more sensitive to copper, mercury, zinc, phenol and pentachlorophenol. Through comparison of a limited number of taxonspecific SSDs, we observe that there is a general decline in chemical sensitivity from algae to crustaceans, molluscs and then fishes. Following a statistical analysis of the results, we recommend an extrapolation factor of two for deriving tropical WQG from temperate information.