Statistical methods for hydrologic modelling have evolved rapidly over the recent past, with a greater focus being placed on quantifying uncertainties in addition to locating optimal model parameters. However, despite the advances that have been made in statistical applications, there is still much work to be done. In particular, the challenges of the Predictions in Ungauged Basins (PUB) initiative have persisted despite valuable progress in the statistical techniques used in hydrologic modelling. Here, we present a hierarchical Bayesian modelling technique referred to as Bayes Empirical Bayes (BEB) as a means of addressing the difficulties of the PUB initiative (i.e., the transferring of knowledge from data-rich locations to data-poor locations). This method has thus far been untested in hydrologic applications. While established PUB-related studies focus on regression-based techniques to relate a gauged catchment to an ungauged catchment of interest, the BEB technique utilizes Bayesian analysis (specifically the resultant probability distributions for each estimated model parameter – the posterior distribution) to combine information from gauged, reference catchments to generate probability distributions for each parameter at the ungauged catchment of interest. This technique represents a significant departure from simple regression approaches that simply transfer the best parameter set from a reference catchment deemed to be similar (via proximity, topography, climatology, etc.). By utilizing the Bayesian toolkit under a hierarchical approach, information from multiple reference catchments can be integrated and summarized to offer a potential solution to the PUB dilemma.