

Regional prediction of basin-scale brown trout habitat suitability

SERENA CEOLA & ALESSIO PUGLIESE

Department DICAM, University of Bologna, Bologna, Italy

serena.ceola@unibo.it

Abstract In this study we propose a novel method for the estimation of ecological indices describing the habitat suitability of brown trout (*Salmo trutta*). Traditional hydrological tools are coupled with an innovative regional geostatistical technique, aiming at the prediction of the brown trout habitat suitability index where partial or totally ungauged conditions occur. Several methods for the assessment of ecological indices are already proposed in the scientific literature, but the possibility of exploiting a geostatistical prediction model, such as Topological Kriging, has never been investigated before. In order to develop a regional habitat suitability model we use the habitat suitability curve, obtained from measured data of brown trout adult individuals collected in several river basins across the USA. The Top-kriging prediction model is then employed to assess the spatial correlation between upstream and downstream habitat suitability indices. The study area is the Metauro River basin, located in the central part of Italy (Marche region), for which both water depth and streamflow data were collected. The present analysis focuses on discharge values corresponding to the 0.1-, 0.5-, 0.9-empirical quantiles derived from flow-duration curves available for seven gauging stations located within the study area, for which three different suitability indices (i.e. ψ_{10} , ψ_{50} and ψ_{90}) are evaluated. The results of this preliminary analysis are encouraging showing Nash-Sutcliffe efficiencies equal to 0.52, 0.65, and 0.69, respectively.

Key words flow-duration curve; Top-kriging; habitat suitability; brown trout