

Classifying Gaining and Losing Streams Using Stream Typology and Distributed Hydrologic Modeling

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Abstract. The Russian River basin in Northern Coastal California, with its Mediterranean climate and diverse topography, supports a multi-billion dollar wine industry that is recognized on an international scale. At the same time, the basin also supports a variety of threatened and endangered fish species, whose different developmental stages are supported by the variable streamflows that result from the distinct wet and dry seasons in the basin. The irrigation needs of the wine industry are often at odds with instream flow requirements for fisheries habitat. As such, a variety of research efforts are focused on better understanding the basin hydrology and the interaction between agriculture and the environment. One such effort is the development and application of a geomorphically-based stream typology to characterize tributaries within the basin to infer surface-groundwater interactions and the subsequent availability of instream habitat. While this method is useful for providing a qualitative description of streamflow characteristics, further categorization of a stream as gaining or losing would require a significant level of instrumentation along the longitudinal stream gradient and could prove prohibitive. As an alternative, there is potential in using routed surface flow estimates from a distributed hydrologic model as a proxy for gage data in stream classification. A Research Distributed Hydrologic Model (RDHM) of the Russian River basin has been calibrated to provide routed surface flow estimates of both peak and low flows for a one-kilometer gridded network. This study investigates the use of the stream typology and RDHM streamflow estimates for stream classification and examines the correlation between the two models.