Decision Support System Evaluating Habitat in Alternative Flow Scenarios

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Abstract. There is a need for environmental flow tools that consider both instream and floodplain habitat. A decision support system (DSS) that evaluates fish and vegetation habitat availability in alternative flow scenarios has been developed to support improved habitat management and protection of naturally variable flows. This system uses the results of high resolution 2-D hydrodynamic models to quantify and map suitable habitat for fish and floodplain vegetation at a range of discharges in a reach. The habitat preferences of fish are cross-referenced with the spatial distribution of flow characteristics generated by the hydrodynamic model and, optionally, a map of substrate types in the reach to map suitable habitat at each modeled discharge. Suitable habitat is quantified and used to develop curves of habitat area by discharge. The total suitable habitat area available at any flow within the modeled range can be estimated from these curves. Probability of occurrence of vegetation guilds is related to long term inundation patterns. Floodplain inundation is mapped for each modeled discharge. Probability of occurrence of each guild is mapped based on the exceedance probability of inundation calculated from the flow scenario. Supplying alternative flow scenarios with the historic flow record enables the DSS to describe long-term impacts of withdrawals, reservoir operations, or climate change. These impacts include the potential for vegetation encroachment and changes in monthly fish habitat and probability of occurrence of vegetation guilds. An additional component is in development that will compare alternative flow scenarios based these impacts. This demonstration of the DSS uses the Verde Wild and Scenic River, but the system is applicable to rivers across the country.