

Reimagining the San Joaquin River Using the EcoFIP Framework to Reconnect Floodplains

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Anthropogenic modifications to riverine systems intended to provide flood control and reliable water supply have altered flow regimes and river connectivity leading to heavily degraded freshwater systems. Restoring these systems to meet challenges of flood risk reduction, water scarcity, and changing climates requires an approach that integrates physical alterations to channels and floodplains while accounting for hydrologic changes that systems are experiencing (e.g., reservoir management or changing flow regime). Ecological Floodplain Inundation Potential (EcoFIP) is a methodology and toolbox that facilitates multiple levels of identification, screening, and design of multi-objective floodplain rehabilitation projects. EcoFIP leverages topographic data, hydrology, hydraulic modeling, soil characteristics, and groundwater data to estimate changes in ecosystem benefits resulting from physical alterations to river corridors (e.g., floodplain lowering, levee setbacks, revegetation) and changes in flow conditions (e.g., climate change, reservoir reoperation). EcoFIP can estimate these benefits at macro (river reach) and micro (site-level) scales, enabling evaluation of the ecological characteristics of any boundary of interest for various historical or potential flow regimes. These gains can be reported in metrics such as acre-days of inundated floodplain area, acre-days of suitable floodplain habitat (for salmonids or other species), and groundwater recharge volumes summarized over a range of water years.

A case study applies EcoFIP to assess over 100 miles of the Upper San Joaquin River and flood bypasses between Friant Dam and the confluence with the Merced River, in support of the California Department of Water Resources' Central Valley Flood Protection Plan and Conservation Strategy. The analysis is evaluating current and future flow regimes with the goal of identifying and designing potential multi-objective floodplain rehabilitation sites, that provide high-quality salmonid habitat, and maximize groundwater recharge from floodplain inundation.

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