To: James C. Lee – Science Coordinator – Trinity River Restoration Program (TRRP)

From: Conor Shea - Hydrologist, U.S. Fish and Wildlife Service, Arcata, CA
Kyle DeJuilio, Biologist, Yurok Tribe
David Gaeuman, Geomorphologist, Yurok Tribe

Re: Delineation of Potential Valley Floor

Date: 9/24/2020

Objectives

For several years, TRRP workgroups have proposed developing a "River Corridor" tool that would inform and guide TRRP rehabilitation and management actions. Within the program, the term river corridor is loosely defined and encompasses a broad array of both physical river characteristics and river management guidance. To date, the only formal investigation by the program of implementing a river corridor management tool was prepared by Gaeuman et al. (2016). The study was limited to a pilot study due to time and budget constraints. Gaeuman et al. (2016) identified future steps including investigating additional aspects of river corridor management such as integration of habitat and sediment fluxes. The study produced some valuable insights that have been informally incorporated into program management, but there has been no further development of formal river corridor management tool.

Development of river corridor tools was raised once again at the August 11, 2020 Interdisciplinary Team (IDT) meeting. Kyle DeJuilio described the need to define the limits of the valley floor that potentially be inundated as part of development of the Inundation Effectiveness metric (Gaeuman, 2020) for the Physical Workgroup (PWG). The *Potential Valley Floor* is the zone which potentially could be inundated and where channel migration and floodplain evolution processes could occur. After some discussion, the IDT directed the Physical Workgroup (PWG) to develop a methodology for delineating the limits of the Potential Valley Floor.

Discussion

For purposes of this work, we define the valley floor as the zone that includes primary and secondary river channels, seasonally wetted channel margins, alluvial deposits, floodplains, and wetlands. This zone provides space for alluvial processes such as channel migration and floodplain development to create a diverse range of riparian habitats and trophic resources. The existing valley floor is constrained by several causes including dredge tailings and diminished stream power following dam construction. The river is no longer able to access and rework pre-dam floodplain further confining the riverine ecosystem to a narrow zone adjacent to the existing river channel. Our hypothesis is that restoring the area of valley floor accessible to floods and riverine processes will increase the diversity and amount of riverine and floodplain habitats, and indirectly benefit abundance and survival of juvenile salmonids.

The purpose of the Inundation Effectiveness metric is to evaluate the effectiveness of TRRP management and rehabilitation actions on increasing floodplain accessibility. The metric is defined as the ratio between the amount of valley floor inundated by existing conditions and flow management to the amount of Potential Valley Floor. A low ratio is an indication of a constrained river system. Management actions that increase the ratio would increase the area for riverine ecosystem processes. We define the Potential Valley Floor as the extent of the valley floor assessible to and reworked by the river prior to anthropogenic disturbances.

The Potential Valley Floor is only one component of a large set of spatial features that would support development of river corridor management tools or strategies. The Potential Valley Floor represents the morphological and physical limits of where river and floodplain processes may occur based on pre-disturbance, non-anthropogenic constraints. It is expected that additional overlays will be created for development of river corridor tools that will define areas where restored river and floodplain processes should be excluded in order to protect private land, public safety, and public infrastructure.

Delineation Methodology

Delineation of the Potential Valley Floor may require several levels of review and refinement. As a first step, we recommend delineating the Potential Valley Floor with the following procedure:

1) Develop a trace of the alluvial channel and active floodplain features shown on the 1944 and 1960 rectified aerial photo sets. The traces should be combined, and interior islands removed to define the initial spatial limits of the Potential Valley Floor. This procedure is conceptually similar to procedures used to develop Channel Migration Zones in Washington State (Rapp and Abbe, 2003). Our assumption is that the 1944 and 1960 alluvial feature traces represent areas where alluvial and floodplain processes occurred prior to dam closure.

2) Delineate dredge tailing piles within or crossing the initial limits developed in step 1. Add the area occupied by dredge tailings to the spatial limits. Our assumption is that dredge mining occurred in channel and floodplain areas occupied by the river over time. Add the areas that extend beyond the tailing piles to where the existing SRH-2D modeled water surface elevation for the Maximum Fisheries Flow (U.S. Department of Interior, 2000) meets ground at the valley wall.

3) The initial delineation of the Potential Valley Floor should be visually assessed and compared with hydraulic modeling results and physical observations to determine if it is a suitable representation. If the information is available, the limits should be compared known locations of exposed and buried bedrock that projects above the elevation of the Maximum Fisheries Flow. Additional refinements may be required after the initial delineation.

In conjunction with delineating the Potential Valley Floor, it may be advisable to delineate an initial Management Protection Zone. The Management Protection Zone would consist of areas to be excluded from potential inundation by restoration actions in order to protect structures, infrastructure, and public safety.

References

Gaeuman D, R. Stewart, and T. Buxton. 2016. First Steps towards a River Corridor Management Strategy. Trinity River Restoration Program Technical Report TR-TRRP-2016-1, Weaverville, CA.

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Rapp, C.F., and Abbe, T.B., 2003. A framework for delineating channel migration zones: Washington Department of Ecology Publication 03-06-027.

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