Evaluating Effectiveness of Floodplain Reconnection Sites along the Lamoille Valley Rail Trail: A Blueprint for Future Rail-River Projects

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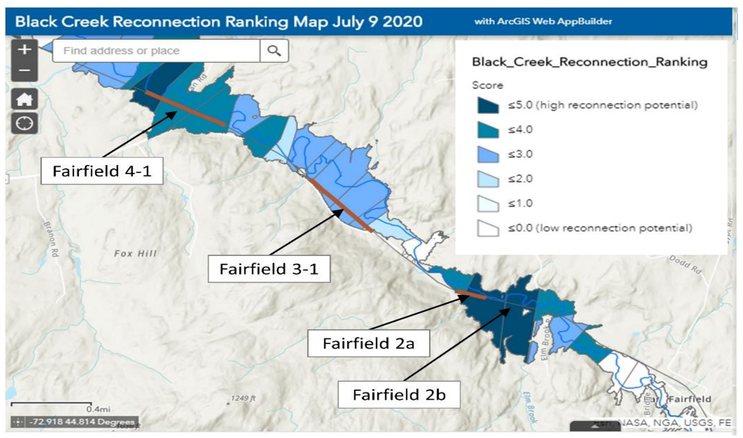
Introduction

Lowering of rail beds to restore floodplain connection (Figure 1) is a river restoration practice with great potential, but which must also consider the multiple uses and functions of river and rail corridors, along with the potential impacts and benefits to adjacent infrastructure, life safety, health, and the environment.

Figure 1. Example of rail bed lowered to the natural floodplain along Black Creek, Fairfield, VT.

Screening Protocol

A screening protocol was developed for LVRT segments along the Black Creek and Lamoille River valleys to prioritize potential floodplain reconnection sites for further vetting through field inspection. Ten out of twelve reconnection sites completed along the LVRT in 2006-2008 were predicted as a priority in a retrospective application of this protocol.



Low-complexity (Height Above Nearest Drainage) hydraulic modeling results confirmed that most completed projects provided substantial increases in the floodplain capacity for floods of 2- to 500-year recurrence intervals.

Figure 2. Excerpt from web map of rail trail reconnection ranking map for Black Creek. Darker blue shading indicates higher priority for reconnection. Brown lines indicate position of previously-completed rail bed lowering projects.

Modeled Study Area

At a demonstration reach of the Black Creek near East Fairfield spanning two completed and one proposed reconnection sites on the LVRT, reconnection alternatives were evaluated in more detail using a two-dimensional hydraulic model.

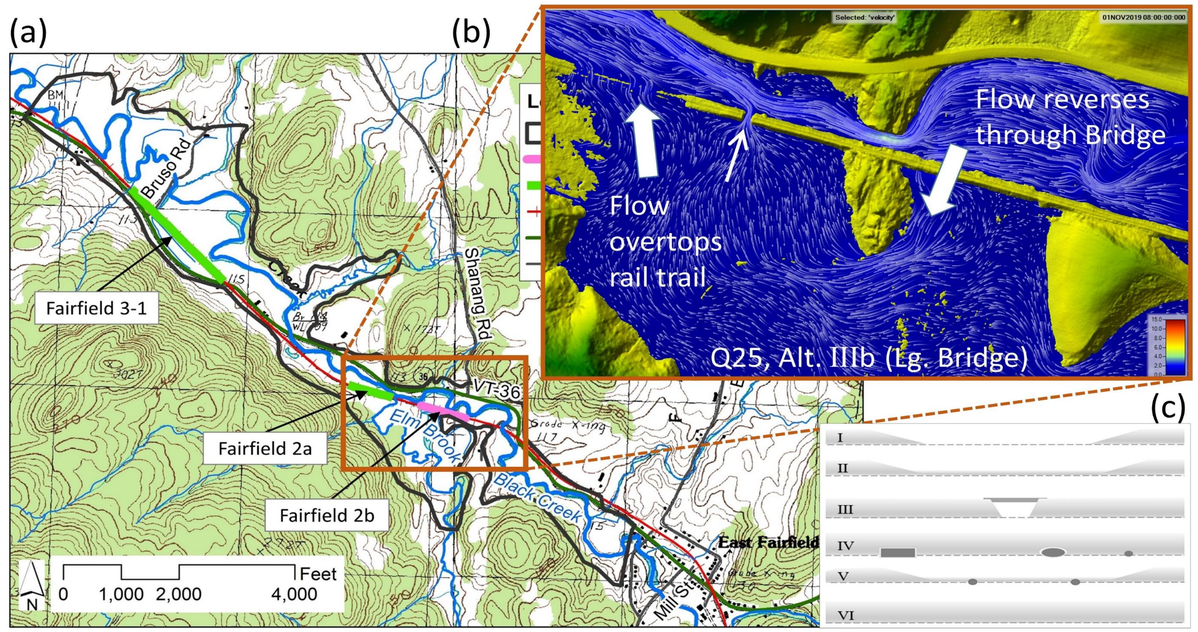


Figure 3. (a) 2D HEC-RAS modeling extent along the LVRT and VT Rt 36, East Fairfield; (b) Simulation of enhanced cross connection between Black Creek and Elm Brook floodplains during a 25-year flood; (c) Six modeled rail modification alternatives (bridges, culverts, rail berm lowering).

Modeled reconnection alternatives resulted in modest changes in flooding parameters at the proposed site due to an unexpected, existing degree of cross connection between floodplains of the Black Creek and Elm Brook tributary.

Future Applications

The hydraulic modeling products and scenarios developed for this project are being adapted to support analysis and modeling of fine-sediment and phosphorus attenuation as the Vermont Agency of Transportation continues to collaborate with the Vermont Agency of Natural Resources and other stakeholders to develop a phosphorus-crediting framework for floodplain reconnection projects.

Acknowledgments

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