

WATERSHED-SCALE AND LONG-TERM CONSIDERATIONS



Photo credit: Ken DeCamp

AUTHORS

Jock Conyngham (Environmental Laboratory, ERDC, USACE)
Judsen Bruzgul (ICF International)
Jim MacBroom (Milone & MacBroom, Inc.)
Rebecca Manners (University of Montana)
Roy Schiff (Milone & MacBroom, Inc.)
Ellen Wohl (Colorado State University)
Katy Maher (ICF International)

Watershed-scale and Long-term Considerations in Restoring Large Wood to Riverine Ecosystems

Jock Conyngham

Research Ecologist

Jock.N.Conyngham@usace.army.mil

ERDC Environmental Laboratory

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Our fundamental thesis

- ▶ If river restoration is to address impacts in their current distribution and degree at minimal expense and risk and maximal physical, biotic, and programmatic effectiveness, it must address long-term basin-scale processes that drive form and function.
- ▶ For the large wood, that requires restoration of *supply*, recruitment, *transport*, deposition, and dynamic regimes.
- ▶ Well, that sounds easy enough.

Supply—the primary driver

- ▶ The presence of “large “ wood (relative to channel dimensions as they change and grow through the drainage network)
- ▶ Sources of impact: landscape-scale forest removal, short-rotation forestry, and forest pests and pathogens. N.B. This issue is currently in a state of partial self-restoration in the upper basin areas of many US watersheds.



Recruitment

- ▶ The alluvial and colluvial processes that move wood to the fluvial system—or vice versa. Incremental and avulsive lateral dynamism, moderate and extreme floods, and major storm events are important mechanisms.
- ▶ Sources of impact—channel hardening-in-place and the transportation infrastructure in valley bottoms that drives it.

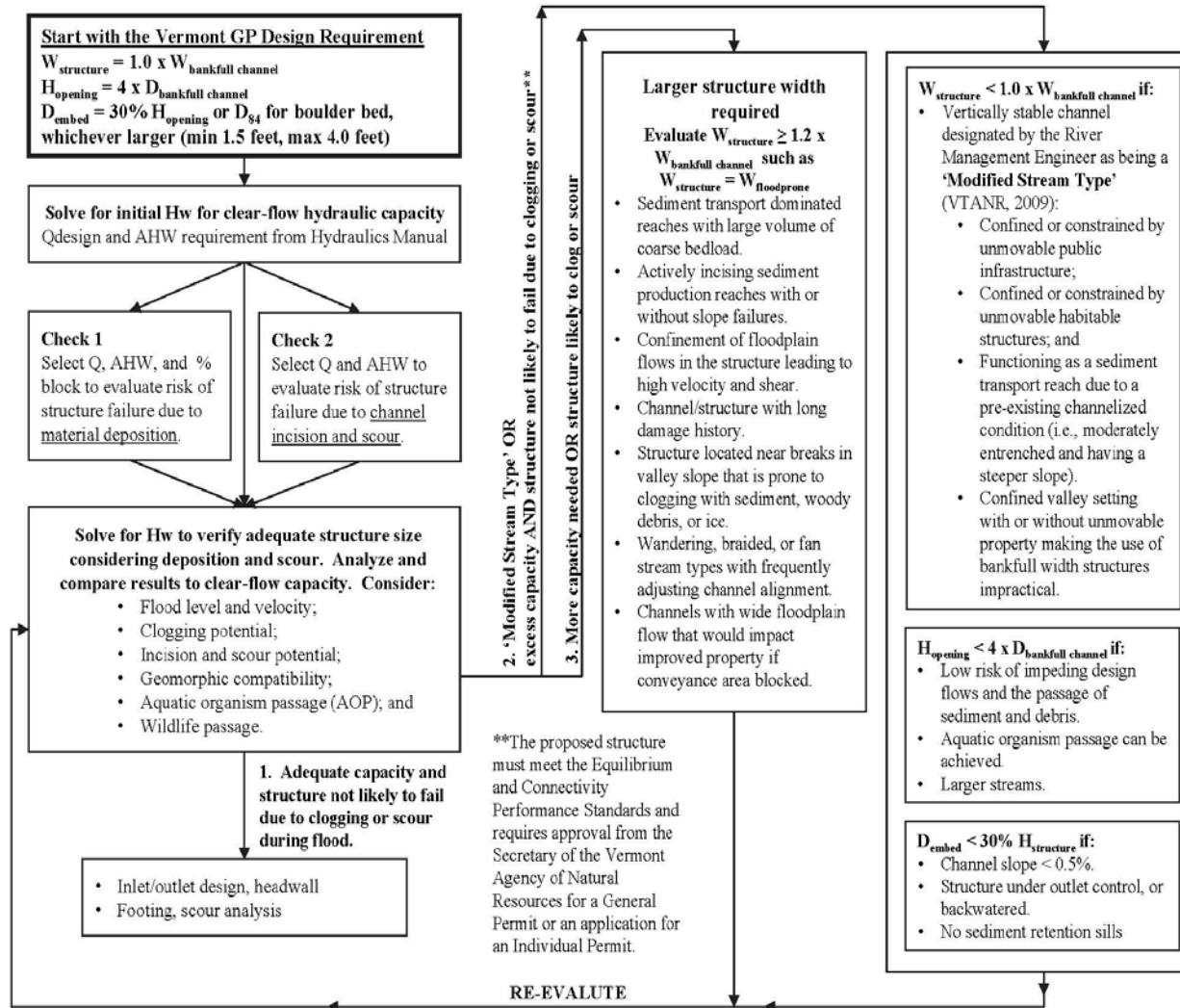


Large wood transport and continuity—a second primary driver

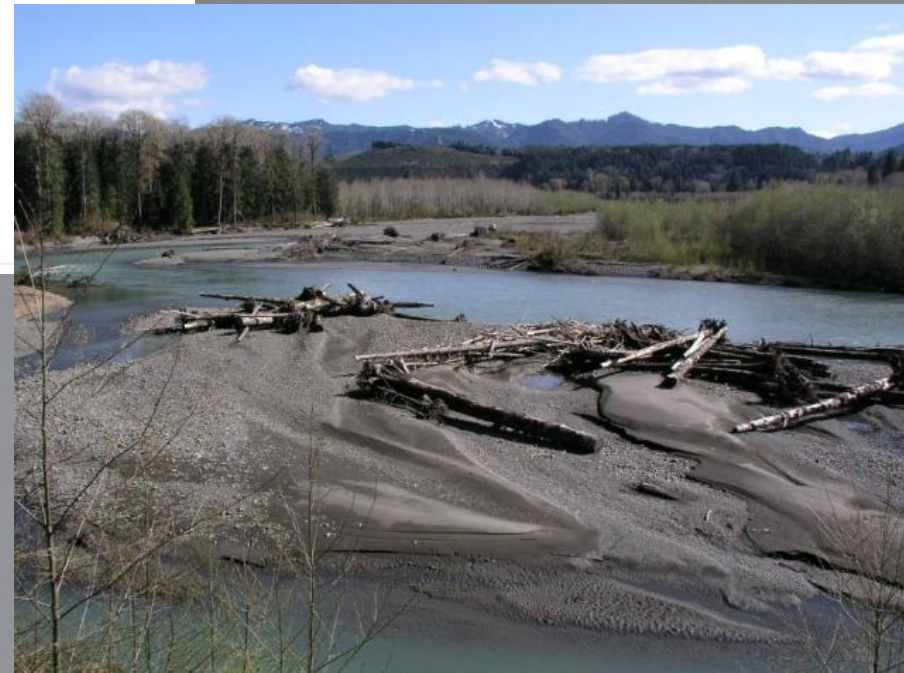
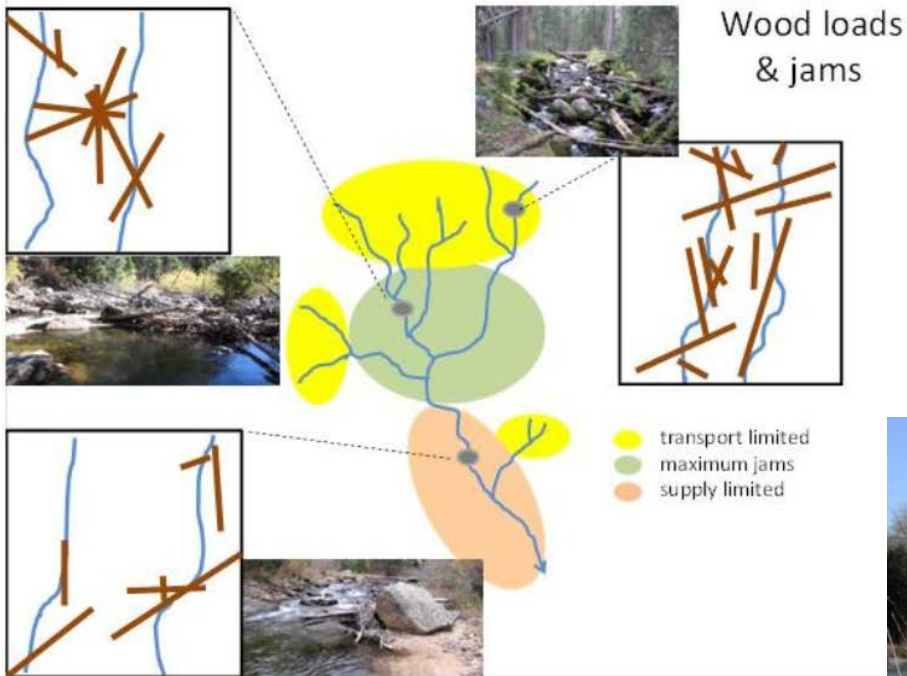
- ▶ Large wood transport is critical, complex, and difficult to parameterize. It has spatial and temporal components. It has been highly altered by inadequate culvert and crossing designs, dams, fencing systems, and diversion structures.



Advancing crossing design guidance

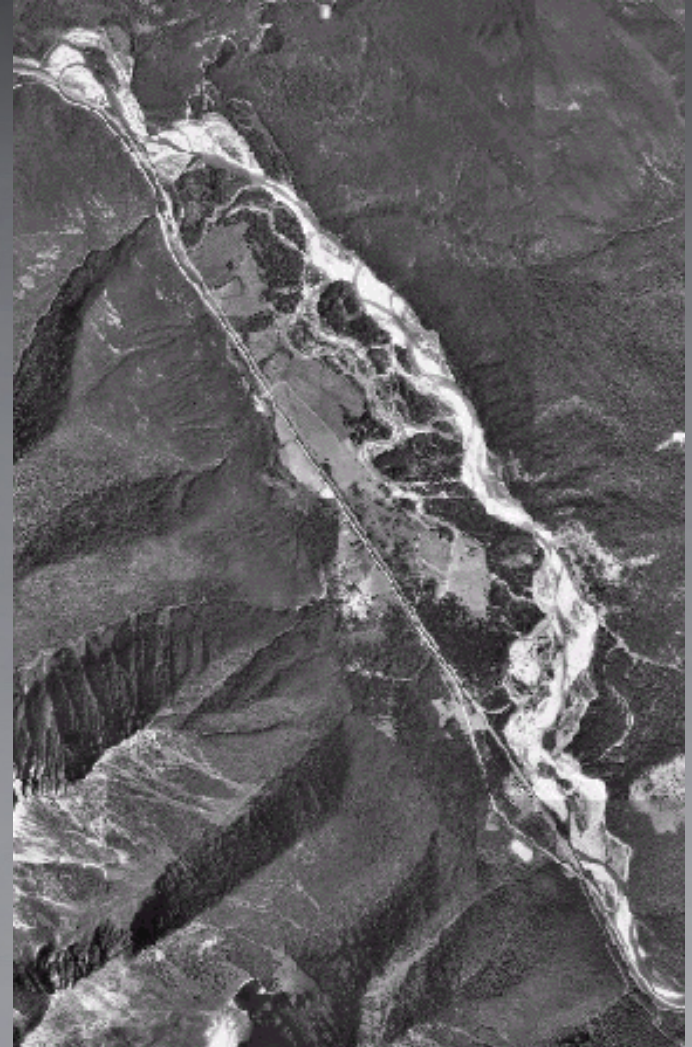


Deposition



Dynamism

A wide range of peak flows, a normative wood regime, and ice-related phenomena all lead to hyporheic reconnection, the presence of early successional riparian communities, and a shifting habitat mosaic. Without those high flows, dynamism degrades or disappears.



Debris planning and management in floods



A few implications

- ▶ The re-establishment of conditions for passive restoration requires large scale river corridor management techniques that lie beyond the individual mandates of any one agency but support the goals of many.
- ▶ Fragmentation impacts much more than fish passage.
- ▶ We need to learn from failures of stream crossing infrastructure.
- ▶ The usual cognitive and policy associations between “large wood” and “debris” needs careful rethinking.

