

National Large Wood Manual

Assessment, Planning, Design, and Maintenance of Large Wood in Fluvial Ecosystems: Restoring Process, Function, and Structure

January 2016



U.S. Department of the Interior
Bureau of Reclamation



US Army Corps
of Engineers
Engineer Research and
Development Center

Chapter 6 ENGINEERING CONSIDERATIONS



Complex timber revetment designed to protect bank by partitioning shear stress while also creating cover and hydraulic refugia for salmonids, South Fork Nookack River, Northwest Washington (Tim Abbe 2012)

AUTHORS

Doug Shields (Shields Engineering, LLC)
Tim Abbe (NSD)
Mike Hrachovec (NSD)
Leif Embertson (ICF International)
Carl Jensen (ICF International)



Hydrology | Hydraulics | Geomorphology | Design | Field Services

Engineering considerations for placing large wood in streams

Doug Shields, cbec eco-engineers

April 19, 2016

1255 Starboard Dr., Suite B, West Sacramento, CA 95691 USA
T/F 916.570.2502 C 916 243 8290 c.bowles@cbecoeng.com
www.cbecoeng.com

A promising beginning

Little Topashaw Creek, 1999



72 LW structures built, 2000



4/19/16

National Conference on Ecosystem
Restoration

Initial response was negative, but

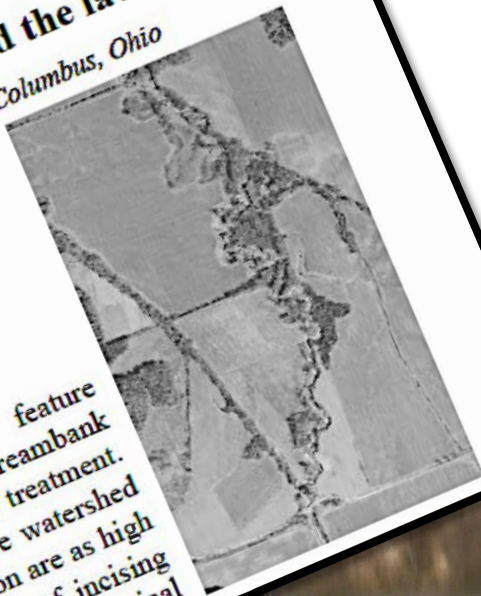
Jan 24, 2001

Large wood as a restoration tool: I fought the law, and the law won
STREAMS Channel Protection and Restoration Conference, October 6-7, 2003, Columbus, Ohio

F. Douglas Shields, Jr.
USDA-ARS National Sedimentation Laboratory
Oxford, MS 38655-1157
dshields@ars.usda.gov

Introduction

Traditional incised stream channel stabilization projects feature combinations of grade control drop structures, riprap streambank protection structures, drop pipes, small reservoirs, and land treatment. These methods are effective, but costs for treating an entire watershed range as high as \$750 ha⁻¹, and costs for channel stabilization are as high as \$399 m⁻¹. Previous work has shown that stabilization of incising channels and their stream corridors can have major, positive ecological



01/27/2006

How can **you** avoid the heartbreak of LW project failure?

- It's complicated....wood decays and floats
- Big questions should be answered first
- Better living through engineering
- Get the latest guidance



The big questions (fundamental issues)

- Active or passive?
- Location, location, location.
- Wood is a temporary measure to “bridge” to.....???
- What is our long term vision for **future** wood sources, sinks and transport?



More big questions

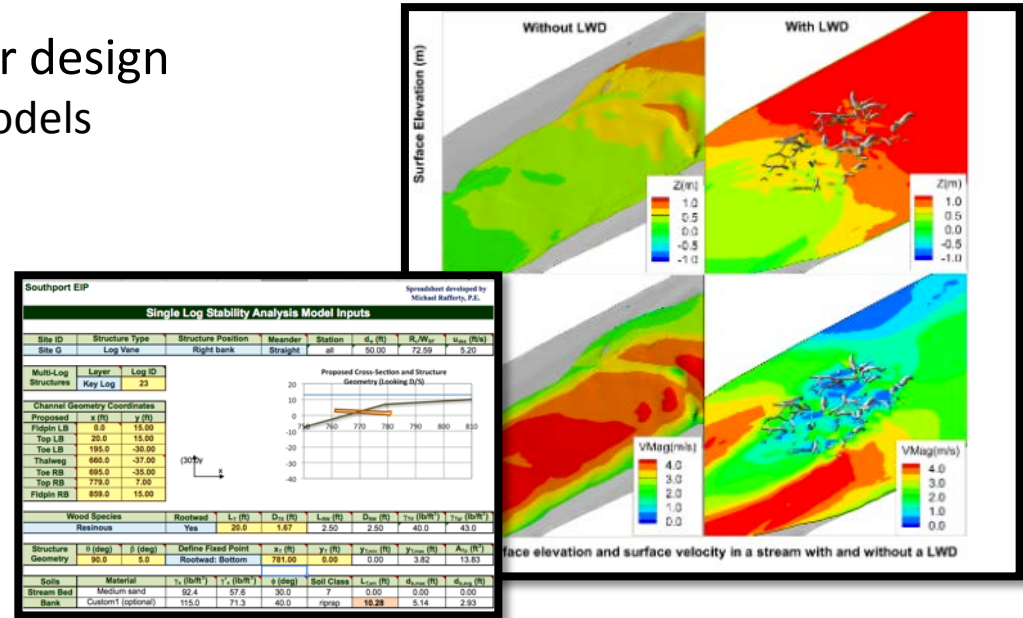
- How well do we understand the system geomorphology?
- Is ecosystem wood limited?
- How will wood placement form and maintain desired habitat features?
- How will our restored system interact with the built environment?



American Whitewater Association

Better living through engineering

- Appropriate level of effort for design
 - Judgment/spreadsheets/models
- Conveyance
- Force and moment analysis
 - Buoyancy
 - Drag
 - Friction
 - Restraints
 - Lift
 - Ice
- Scour and sedimentation analysis



<https://www.linkedin.com/pulse/cfd-modeling-lwd-hydrodynamics-liagat-khan>

Even better living through top notch implementation

Safety/control of adverse impacts

Contract options/Inspection



How can **you** avoid the heartbreak of LW project failure?

- Big questions should be answered first
- Better living through engineering
- Get the latest guidance

