Strainers, Logs and Logjams:

Reducing Recreational Risks While Protecting River Ecology

2018 River Management Society Symposium

October 25, 2018

Goals

- Consider possible agency/organization roles
- Provide a common vocabulary for discussion
- Increase knowledge about instream wood, or large wood (LW):
  - Distribution, sources, transport and accumulation
  - Ecological processes, functions and values
  - Recreational risks, hazards and challenges
  - Trends associated with climate change
- Explore WSRA “protect and enhance” approaches on WSRs
- Review possible instream wood management activities
- Consider related management topics (e.g., landowner approval, liability and BMPs)
- Discuss management rationale, unanswered questions and next steps

What is my agency or organization's role?

- Educate, review, manage, etc.?
  - Provide info to others
    - LW role in river processes and ecology
    - Safety risks/challenges for navigation
  - Fund/manage activities
    - Map and describe existing conditions
    - Assess ecological/recreational factors
    - Prepare management plan & protocols
    - Conduct LW manipulation operations
    - Monitor change in use and conditions
  - Review/comment on proposals and permit applications

Photo: Julie Isbill

Wood in rivers and streams

Photo: Preston Samuel

- Present globally in river systems
  - LW: ≥ 10 cm in diameter; ≥ 1 m in length
  - Linear, unidirectional ecosystems
- Recruited via natural processes:
  - Avulsions, beaver activity, chronic mortality, erosion, floods, ice/wind storms, landslides and wildfires
- Transported by high flow events
- Accumulation patterns are varied
  - Individual logs, clusters, logjams and rafts
- Wood loads differ depending on:
  - Land use practices
  - Past/current channel management
    - Removal, relocation and re-introduction

LW management through time

- Stone Age: Driftwood collected for fuel and building materials
- Medieval times: Cleared to float logs in European rivers
- ~1800: Removed for bridges and mills, flooding, log drives and navigation
- 1830s: Snagging of 160-mi. Great Red River Raft for navigation (AR, LA)
- 1980s: Reintroduced to offset removal
- 2001: Wood loadings worldwide in many rivers found markedly reduced

Photo: Noel Memorial Library - LSU Shreveport

Photo: Jim MacCartney

Role of large wood in rivers and streams

Photo: Jim MacCartney

- Fluvial processes
  - Key structural component in rivers
  - Produces hydraulic/flow complexity
  - Channel and floodplain exchange
- Channel morphology
  - Affects slope, x-section and pattern
  - Promotes sediment storage
- Ecosystem functions and values
  - Provides habitat diversity
  - Increases species richness and abundance

Watershed position

- Effects vary with channel size
  - Headwater streams: Logs often form step-pools
  - Mid-sized rivers: Logs form clusters or jams that affect bars/meanders
  - Large rivers: Logs can form rafts and create braided channels
- Influence habitat availability
  - More complex physical habitat
  - Greater diversity and abundance of aquatic organisms

Photo: Jim MacCartney

Impacts of global change on instream wood dynamics

Lookout Creek, Chickamauga and Chattanooga National Military Park

Climate change

- Increasing frequency and magnitude of storm events (e.g., hurricanes)
- Increasing frequency and duration of droughts
- Increasing frequency and magnitude of wildfire

Increasing urban interface

- Anthropogenic debris jams include litter, plastics, etc.

Challenges for recreational navigation

Photo: Preston Samuel

- Encounters increasing with shift to more natural levels of LW
- Safe passage more difficult with:
  - High frequency of use
  - Level of difficulty rating (Class I – VI)
  - Increased flow velocity and stage
  - Level of experience (novice – expert)
  - Percent of channel blockage (>2/3)
  - Current passing thru LW; entrapment risk
  - Difficult or impossible portage
  - Obscured hazards
- Travel time / inconvenience

“Protect and enhance” on Wild and Scenic Rivers

Metolius WSR Management Plan – Oregon (USFS, 1996)

- Instream Wood
  - Large logs in the river provide valuable cover for fish, rearrange flows, diversify stream structure, provide food and habitat for invertebrates, and provide the foundations for the unique Metolius islands. Logs or logjams that span the river may provide the most valuable instream habitat. Instream wood may block passage for boaters, create boating hazards, and result in portages that adversely impact riparian vegetation. It is possible to adjust logs to allow for passage without a total loss of habitat value. Historically, woody material has been manipulated and removed from the river, so current amounts of logs in the river are less than what naturally occurred.
- Proposed Action
  - Minor manipulations of wood (trimming and limbing of hazards that are located where they cannot be seen in time to avoid by either standing up or portaging around them) are allowed upstream from Gorge Campground, but boating passage is not provided. Between Gorge Campground and Bridge 99, minimum safe boating passage is maintained in a manner that minimizes riparian impacts and maximizes instream habitat value. There is no wood manipulation downstream from Bridge 99.

“Protect and enhance” on Wild and Scenic Rivers – cont.

Snake River Headwaters WSR Management Plan – Wyoming (USFS, 2014)

- LW is native plant matter of *any* dimension that could provide:
  - Bank stabilization; sediment filtration and nutrients; decreased velocity; microclimate; wildlife habitat and connectivity; habitat supporting a diverse, stable aquatic community
- Removal (minimum necessary) may be considered under the following conditions:
  - Human-induced source
  - Recreation considerations:
    - % Channel blockage: >2/3; main flow through LW; little option for safe passage or portage
    - Obscured hazards: Hidden, unavoidable, in a roaded area, highly difficult to portage, likely to entrap a human, on a frequently paddled stretch of a *Class II-IV* section.
  - Other Considerations
    - Critical Infrastructure: Removal may be allowed if threatening to impact exiting critical infrastructure.

Wild and Scenic Rivers Act – Section 7

- Intent: Protect from harmful water resource project effects
- Applies to:
  - Designated rivers and 5(a) studies
    - Federally-assisted projects: (funding, permits, etc.)
    - Water resource projects: (construction below OHWM)
- Prohibits: Adverse effects to river values (WQ, free-flow, ORVs)
- Supplements: CRMP direction

Photo: NPS Wekiva River

Possible instream wood management activities

- Map/describe each blockage
  - Record observed discharge (cfs)
  - Record location (lat/long) w/ GPS
  - Determine % channel obstructed
  - Count number of trees in cluster
  - Measure individual log sizes
  - Estimate portage length/conditions
  - Record bank height, slope, stability
  - Identify possible LW manipulation
  - Determine adjacent landowner(s)

Source: Google

Decision support protocol

Field assessment of instream wood

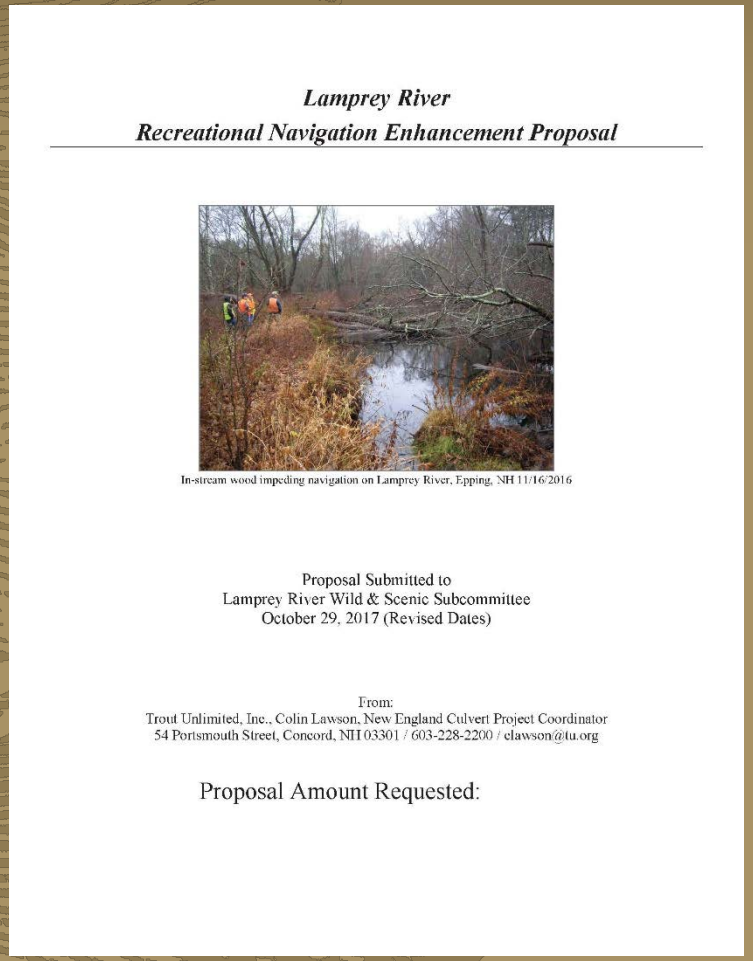
Ecological factors

- Aquatic habitat complexity
- Bed and bank stability
- Channel morphology
- Floodwater retention
- Flow complexity
- Invertebrate life cycles
- Nutrient retention
- Riparian habitat connectivity
- Species abundance and diversity
- Water quality and sediment transport

Recreational factors

- Difficulty of maneuvering
- Flow concentration and velocity
- Frequency of use
- Level of difficulty rating
- Portage difficult or impossible
- Risk of entrapment
- Risk of pinning or capsize
- Travel time
- Visibility of obstruction
- Wildlife sightings

Possible instream wood activities – (cont.)



Lamprey River
Recreational Navigation Enhancement Proposal

In-stream wood impeding navigation on Lamprey River, Epping, NH 11/16/2016

Proposal Submitted to
Lamprey River Wild & Scenic Subcommittee
October 29, 2017 (Revised Dates)

From:
Trout Unlimited, Inc., Colin Lawson, New England Culvert Project Coordinator
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Proposal Amount Requested:

Source: Colin Lawson

- Prepare management plan and protocols
  - Describe goals and objectives
  - Identify permit/approvals needed
  - Document site selection criteria
  - Specify target recreational flows
  - Identify selected work areas
  - Compile required safety protocols and wood manipulation BMPs
  - Prepare construction sequence
  - Detail project timing (e.g., low flow)

Possible instream wood activities – (cont.)

- Conduct LW manipulation work
  - Mobilize equipment and personnel
  - Deploy erosion / sediment controls
  - Manipulate and/or relocate LW
  - Remove E&S measures, de-mobilize
- Monitor change in use/condition
  - Conduct baseline assessment of use
  - Photo/survey as-built conditions
  - Monitor future recreational use
  - Document any ecological changes

Photo: Minnesota DNR

Related topics: landowner approval, liability and BMPs

Photo: Jim MacCartney

- Landowner approval / access
  - Often needed to access work areas
  - Required for most permits
- Liability
  - Does management of LW create false expectation of safety?
  - Is interpretive signage needed at access points? What content?
  - Who is responsible for unintended property damage or bodily harm?

Best practices for instream wood manipulation

- Personal/worker safety
  - Training, equipment, protective gear
  - Conduct work during base flow periods
- Navigational safety
  - Ensure passage route is obvious
  - Favor openings on the outside of meander bends
  - Avoid creating new navigational hazards or obstructions
- Visual impacts
  - 30-45° bevel cut ends to mimic beavers
- Ecological impacts
  - Manipulate the minimum necessary for safe passage (~6'W x 3'H x 3"D at base flow)
  - Limit opening to 1/3 of channel width (center, left or right)
  - Pivot wood if possible, don't cut
  - Avoid dislodging embedded wood
  - Trim limbs instead of cutting trunks
  - Use bio-based bar oil & hydraulic fluid
  - Relocate within channel; avoid removal
    - Mimic natural stable accumulations
    - Entangling with existing wood or boulders

Discussion questions

- How are ecological and recreational values balanced?
  - How much and what types of manipulation are OK?
  - In which segment(s)? Why? (What's the rationale?)
- What is the baseline in the context of climate change?
- What is the agency or organization's role?
- Is there a need for standardized protocols or wood management toolbox? Rivers.gov?
- Are there remaining unanswered questions?
- What are the next steps?

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Photo: Jim MacCartney