Riparian Restoration

Science, Social Acceptance and the Role of Monitoring

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restoration

*noun* res·to·ra·tion \\ˌres-tə-ˈrā-shən\

: the act or process of returning something to its original condition
: the act of bringing back something that existed before
: the act of returning something that was stolen or taken

Source: Merriam-Webster's Learner's Dictionary
Loss of
• Riparian shrub communities
• Bank stability
• Stream shade

• Connected Floodplains
• Hydric plant species
• Aquatic habitat
• Perennial water
• ...
Ecological Restoration

Assisting the recovery of an ecosystem until it

• contains sufficient biotic and abiotic resources to continue its trajectory of recovery
• functions normally for its ecological stage of development
• demonstrate resilience to normal ranges of environmental stress and disturbance

(Society for Ecological Restoration 2004)
Basic premise

$\text{recovered ecosystems}\neq\text{historic ecosystems}$
Why active riparian management?

• Reconnecting floodplains of incised streams
• Restoring riparian vegetation
• Increase water storage
• Improve fish habitat
• Improve beaver habitat

Source: Bouwes et al. 2016
Considering silviculture treatments including fire

• Avoidance of active management in many riparian areas
  • Unintended consequences?

• Reduction of conifer density and overstory canopy to
  • Improve forest health
  • Modify fire behavior by reducing fuel loadings
  • Restore landscape pattern
  • Grow and deliver large woody debris
  • Increase cover and diversity of deciduous woody species.
Fire suppression has changed the distribution of scrub-shrub, forest, mixed and meadow riparian communities.

“... targeted and limited riparian silvicultural treatments aimed to restore the scrub-shrub community within appropriate streams in headwater systems may offer great habitat diversity without compromising habitat quality.

Liquori and Jackson 2001
“... results from this study indicate riparian forests should be managed according to the historical fire regime of the forest type rather than distance from a stream”

Olson 2000.
“In certain riparian areas, fire frequency has generally been lower, and fire severity has been more moderate than in adjacent uplands, but in other areas, fires have appeared to burn riparian areas with comparable frequency.”

Dwire and Kauffman, 2003
It depends.
Design
Implement
Monitor
Evaluate
Assess
Adaptive Management Spiral

Shared Learning

Initial Design
Revision 1
Revision 2
Revision X
Desired Outcome
Project specific monitoring

• What are the effects of restoration treatments on
  1. Riparian vegetation
     ✓ Composition, cover and structure
     ✓ Deciduous woody species
     ✓ Hydric species
     ✓ Invasive plants
  2. Stream shading and stream temperature
  3. Ground disturbance, bank stability and channel morphology
Case Study 1: Wolf Creek, Malheur NF

- Initial Treatment of 95 acres within RHCA
  - Only trees < 21”dbh
  - No primary shade trees
  - No bank stabilizing trees
  - Full suspension over snow
  - Placement of large woody debris (LWD)
  - Place slash to discourage ungulates

- Adaptive management of additional 218 acres
  - If hardwoods increase by 5% cover
Before

After

Control

Impact
Monitoring methods - 2

- Photomonitoring
- Belt transect
- Line point intercept
- Stream shading
- Stream temperatures
Vegetation Inventory

• Modified Line Point Intercept
• 3 strata
  • Herbaceous (< 1m)
  • Shrub (1-5 m)
  • Tree (>5 m)
• Advantages
  • Relatively fast
  • Little observer bias
  • Foliar cover and basal cover
Foliar Cover
Soil surface with leaves directly above, not including space between leaves.

Basal Cover
Portion of plant that grows into soil surface.

Consistent through season but low covers
Depends on grazing use and season
Before treatment: Conifers

% Foliar Cover

- Treatment
- Control
Before treatment: Deciduous shrubs and trees

![Bar chart showing % Foliar Cover for Treatment and Control groups.](chart.png)
Before treatment: Hydric grasses, sedges, rushes
Before treatment: Introduced perennial grasses and forbs
Before treatment: Bare ground

% Foliar Cover

Treatment

Control
Before treatment: Invasive plant species

% Foliar Cover

- Treatment
- Control
Before treatment: Stream shade

% Stream Shaded

Treatment

Control
Hopes

- Deciduous shrubs and trees $\leftrightarrow +$
- Hydric grasses, sedges, rushes $\leftrightarrow +$
- Stream shade $\leftrightarrow = \text{to} +$

Expectations (= Hypothesis)

- Conifer canopy cover $\leftrightarrow = \text{to} +$
- Deciduous shrubs and trees $\leftrightarrow = \text{to} +$
- Hydric grasses, sedges, rushes $\leftrightarrow = - \text{to} =$
- Stream temperature $\leftrightarrow = \text{to} +$
Case Study 2: East Fork Big Creek, Malheur NF

• Another **BACI** design – Big Mosquito Project
• 2 treatments with 3 randomly selected reaches each:
  • Forest openings
  • Leave patch (control sites)
• Monitoring in 2016 along 63 transects
• Implementation in 2016
Don’t we already have enough data ...?

Pacfish Infish Biological Opinion Effectiveness Monitoring
Why should we monitor?

- Compliance with regulatory agencies in RHCAs
  - Addressing RMOs (riparian management objectives) through monitoring will assist with consultation
- Reduce scientific uncertainty regarding ecological responses in riparian systems
- Find new levels of agreement in controversial issue of active riparian management

Learn and Adapt!
Thank you

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