

## State Trust Lands Habitat Conservation Plan

### RIPARIAN SILVICULTURE TREATMENT ALTERNATIVES

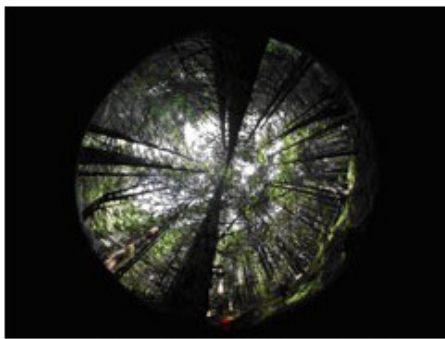
Riparian effectiveness monitoring is being conducted to identify the most effective silvicultural treatments to restore riparian forests to older forest conditions. Effectiveness monitoring for the stand thinning treatments included in the Riparian Forest Restoration Strategy (RFRS) is designed to (1) determine whether DNR's management actions are achieving desired habitat conditions and (2) improve the effectiveness of existing options and explore the feasibility of alternatives. This monitoring will provide the data needed to develop new silvicultural systems that are both effective and cost-efficient.

Monitoring the effectiveness of forest restoration actions requires measuring the response of forest vegetation and structure to thinning treatments in riparian areas. Scientifically valid monitoring of these activities (silvicultural treatments) requires untreated controls and randomized sampling. We employ an active adaptive management approach using a before-and-after control-impact design. Replicate monitoring sites are established within the six Westside Habitat Conservation Plan planning units in order to evaluate the full suite of riparian silvicultural treatments and to assess how these activities may be affected by local and regional differences in growing capacity and forest type. Our monitoring plan explicitly addresses the following questions, which help us assess how well the management of riparian zones maintains or restores riparian forests.

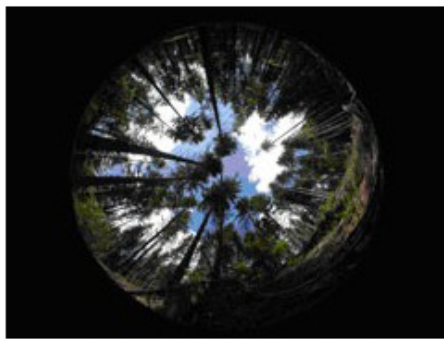
- Which silvicultural prescriptions are most effective for restoring riparian forest structure?
- How does riparian management zone (RMZ) forest stand structure influence its function (i.e., supply adequate quantities of large woody debris, shade, nutrients, sediment filtering, etc.)?
- What is the rate of woody debris delivery from different types of RMZs?
- What is the structure and species composition of DNR-managed RMZs, and how do these compare to unmanaged riparian forests over time?

#### Monitoring Plan

Active monitoring requires untreated control areas, before and after measurements, and carefully controlled treatments so that true replicates can be produced. Silvicultural prescriptions applied to the riparian buffer are considered working hypotheses to be tested through effectiveness monitoring. Results from effectiveness monitoring will allow us to modify future management and research.



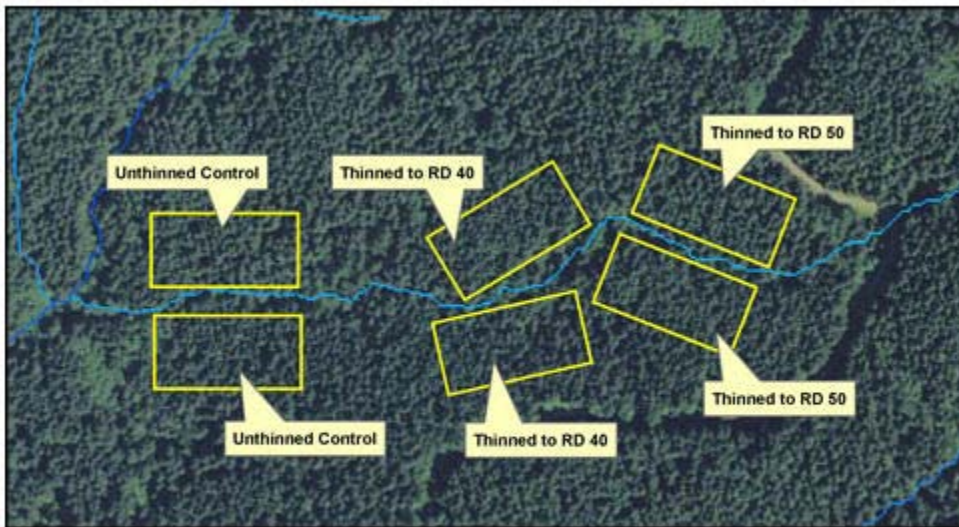
Canopy photograph taken before restoration activities.



Canopy photograph taken after restoration activities. Note the more open canopy.

## Establishing Treatments

After an RMZ has been selected for monitoring, it is divided into separate treatment areas. A treatment area must be at least 450 feet (137 m) long and 300 feet (91 m) wide. It consists of a sampling area at least 330 feet (101 m) long and untreated buffers at least 66 feet (20 m) long on each end of the sampling area. Two 150 foot (46 m) long by 75 foot (23 m) wide grids are established within the sampling area. Each grid has six permanently marked reference points (plot centers) for collecting information on large woody debris, understory vegetation, and canopy cover. The species, dbh, damage, and defect are determined for all trees pre- and post-treatment. Leave trees are tagged so individual tree growth and mortality can be recorded.



Example placement of riparian effectiveness monitoring plots. Each plot, symbolized by a yellow rectangle, measures 300 feet by 450 feet (91 m by 137 m). RD is relative density, a measure of how many trees are in the stand.

## The Understory in Riparian Habitat

We also monitor the response of understory vegetation to riparian restoration activities. Species, percent cover, and structure (e.g., shrub height) are recorded. Understory vegetation can be important to riparian habitat and stream water quality because of the following characteristics:

- Dense fine root mats for bank stability and sediment filtering
- Litterfall to feed the detritus system
- Near stream substrate to provide habitat for insects and other animals
- Near stream cover to lessen extreme microclimate variation

## Monitoring Partners

Coordinating silvicultural activities with riparian effectiveness monitoring complicates timber sale

planning. The terms of the timber sale contract must be shortened to assure that prescriptions are installed less than one year after pre-treatment data are collected. The specifications of the prescriptions may complicate the logging of timber as monitoring may require a temporary foregoing of harvestable acres that are needed as control areas. Close cooperation among foresters and monitoring staff reduces any problems.

**More Information**

Bigley, R. E., W. Scarlett, and J. Ricklefs. 2005. Riparian Effectiveness Monitoring for the WADNR Riparian Forest Restoration Strategy. WA Dept. of Natural Resources. Olympia, WA. Poster.