

Stream Temperature Responses to Timber Harvest and Best Management Practices—Findings from the ODF RipStream Project

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Presentation Abstract

Studies over the past 40 years have established that riparian buffer retention along streams protects against stream temperature increase. This protection is neither universal nor complete; some buffered streams still warm, while other streams' temperatures remain stable. Oregon Department of Forestry developed riparian rules in the Forest Practices Act (FPA) to protect fish-bearing streams from temperature increases, but it did so with acknowledgement that its rules might be insufficient. It developed the Riparian and Stream Function project, otherwise known as RipStream, to validate the effectiveness of these rules. The FPA stipulates that for Small and Medium fish-bearing streams, no cutting is to occur within 6 m adjacent to the stream and limited entry may occur within 15 and 21 m, respectively. The Oregon State Forest Management Plan (FMP) builds upon the FPA but includes additional protections in order to meet multiple management objectives. State forest riparian protections include an 8-m no-cut zone, an 8- to 30-m zone to be managed for producing mature forest conditions, and limited harvest between 30 m and 52 m. Harvest on state forest can differ from private lands, as state forest stands may be subject to thinning instead of clearcutting. The RipStream project represents a joint effort between State and Private Forest divisions at Oregon Department of Forestry to quantify the effects of timber harvest on stream temperatures. The study includes 15 state forest and 18 private sites. Data on stream temperature, riparian vegetation, channel characteristics, and channel shading were collected at every site for two years pre-harvest and five years post-harvest. Each site included an upstream unharvested control reach and a treatment reach that was harvested after year two. All private sites were clearcut; seven out of eight state sites were thinned. By the second year post-harvest we found no change in maximum temperatures for state forests while private sites increased pre-harvest to post-harvest on average by 0.7°C, with an observed range of response from -0.9 to 2.5°C. State sites additionally demonstrated no difference in temperatures between clearcut and thinned treatments. The observed changes in stream temperature were most strongly correlated with shade levels measured before and after harvest. Treatment reach length, stream gradient, and changes in the upstream reach stream temperature were additionally useful in explaining treatment reach temperature change. Shade was best predicted by riparian basal area and tree height. These findings suggest that riparian protection measures that maintain higher shade, such as those followed in state forests, were more likely to maintain stream temperatures similar to control conditions.

Keywords: riparian buffer, stream temperature, mixed-effects, shade, thinning.

Editors' suggestion:

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