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Historical Implications of the Railroad Crosstie Industry on Current Riparian and Stream Habitat Management in the Central Rocky Mountains

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Abstract.—Rivers and streams have historically been used to transport forest products in many parts of the United States. As the railroad pushed into the Central Rockies during the late 1860s, the need for crossties necessitated the use of many streams as conduits to move timber from the forests to the railheads. While documentation of these "tie drivers" is quite extensive, little research has been done relating their influence on stream and riparian habitats in this region to current resource management activities. The objectives of our paper are to (1) summarize the magnitude and extent of the drives in the Central Rockies, (2) describe their effects on river corridors, and, (3) discuss briefly a planned restoration effort for a driven stream located on the Medicine Bow National Forest of southeast Wyoming.

Between 1868 and 1945, millions of railroad crossties, sawlogs, and mine props were cut and transported down major rivers and their tributaries in Wyoming, Utah, and Colorado. Early reports from the Medicine Bow National Forest estimate that over 75,000 m³ of timber were harvested from that Forest alone between 1860 and 1910. Given the absence of motorized vehicles and developed roads during that period, much of that total was moved by water.

As the Union Pacific Railroad moved across southern Wyoming and northeast Utah in the late 1860s, the first forests cut were in the Laramie, Medicine Bow, and Uinta mountain ranges. Later, with the construction of spur lines, new railroads, and improved transportation routes, extensive timber resources were also exploited in the Sierra Madre, Wind River, and Big Horn ranges. Streams tie-driven included the Little and Big Laramie rivers, Rock Creek, Medicine Bow River, North Platte River, Green River, the Black's Fork, Wind River, Tongue River, Bear River, Henry's Fork, Cottonwood Creek, Mill Creek, and the Smith's Fork.

In Colorado, the east slope provided the majority of forest products for the developing cities of Denver, Fort Collins, Boulder, Colorado Springs, and Pueblo, while on the west slope, tie, mine prop, and cordwood activities were commonplace as development occurred. Major streams supporting tie-drives included those between the Poudre on the north, the Apishapa on the south, and the Taylor in the

western part of the State. The drives varied in length from a few kilometers to well over 320 km and occurred frequently on the Poudre, Big Thompson, St. Vrain, South Platte, and Arkansas rivers, and Boulder Creek.

Tie drives were carried out during high water periods of spring snowmelt runoff, usually May or June. The ties were hewn in the woods during the fall and winter and decked along streams awaiting the spring thaw. To facilitate the drives, flumes and splash dams were often built. Also, "stream improvements" were made to assure a swift trip downstream. Common practices included blocking off sloughs, swamps, low meadows, and banks along wider sections with log cribbing to keep the mix of water and logs in the main channel, and blasting or removing boulders, logs, debris, and encroaching riparian vegetation to prevent jams. Frequently, small low-gradient streams were substantially widened as a result of the frequent flushing by the splash dams and the impact of logs on streambanks. The overall implications to fish habitat are apparent.

Douglas Creek is a moderate sized, brown trout *Salmo trutta* stream that was tie-driven for many years prior to 1945. Given its popularity with anglers, its accessibility, and an augmented low flow regime due to water development, the Medicine Bow National Forest selected Douglas Creek for habitat evaluation in 1987 and development of a detailed restoration plan over 35 km of its length. Our analysis indicated that the steeper, more armored A and B channel types were more resistant to tie-drive effects. Lower-gradient meadow reaches (C channel types), however, were found to be 1.2 to 3.6 times wider than anticipated with minimal bank development, cover, pool quality, and habitat diversity. Carrying capacity estimates for trout were typically less than 30 kg/hectare in these impacted sections.

The habitat restoration plan for Douglas Creek focuses on increasing habitat diversity and cover in the short-term, and decreasing channel width and encouraging bank development in the long-term. A total of 176 treatments has been recommended, 90% of which are located in the 10.5 km of C channel. The most commonly recommended structures are tree revetments on meanders and log/tree funnels on straight sections. Construction is scheduled to begin in 1989.