



2. **Enter WLPZs at a 90-degree angle and limit to one (1) pass (ingress and egress) perpendicular to watercourses, where available.** Limiting these passes reduces compaction. Although, multiple passes may not necessarily result in additional compaction (up to 7 passes).<sup>4</sup>
3. **Equipment exclusion on areas that are unnecessarily steep, inherently unstable, or where saturated conditions are present.** Areas with a high risk of mass wasting or where saturated clay soils are present should be avoided.<sup>5</sup>
4. **Placing bedding (slash) on the equipment pathway to reduce soil compaction.** Using a “random” network of roads and using slash bedding helps to reduce soil compaction and movement impacts.<sup>5</sup> A planning process to use a random network of roads with only single stand entries reduces total soil effects. Additionally, slash packing after operations are finished can act as a safeguard against further soil movement.
5. **Using tracked feller-bunchers as they exert less pressure on soil, or alternatively using high-flotation rubber tire designs.** Point loads are negligible with these designs, resulting in an insignificant effect on soil compaction when combined with slash padding.<sup>6</sup>
6. **Preventing residual stand damage.** Stand damage can be prevented by limiting the number of turns necessary to exit the harvest area, using the smallest equipment appropriate for the job, and delimiting trees prior to removal.<sup>7</sup>

To substantiate this request from the Board, we have drawn on the Board’s Effectiveness Monitoring Committee (EMC) project titled “EMC-2017-006: Tradeoffs among riparian buffer zones, fire hazard, and species composition in the Sierra Nevada.” This project includes mechanical timber harvesting within WLPZs and is currently underway at Blodgett Forest Research Station in Georgetown, CA. The Board granted experimental designation until 2032 to allow the project to further investigate the impacts of feller-bunchers in the WLPZ. Attached below you will find images of the work conducted at Blodgett within Class II WLPZs, including treated and untreated WLPZ areas (Figure 1). Preliminary data from the primary investigator, Dr. Rob York, has not yet detected significant sedimentation in watercourses after feller-buncher use when BMPs are followed. The long-term goal of the study is to inform decision-making related to fuel treatments in WLPZs and the inclusion of an adaptive management framework when considering the use of feller-bunchers in WLPZs. The use of an adaptive management framework would not preclude the use of feller-bunchers in WLPZs while the study is still being conducted; more widespread use would increase opportunities to monitor and better quantify environmental impacts relative to fire hazard reduction benefits.

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<sup>2</sup> Abdullah E. Akay, Mustafa Yilmaz, and Fatih Tonguc. "Impact of Mechanized Harvesting Machines on Forest Ecosystem: Residual Stand Damage." *Journal of Applied Sciences* 6, no. 11 (2006): 2414-419. doi:10.3923/jas.2006.2414.2419.

<sup>3</sup> Verry, Elon S., James W. Hornbeck, and Charles Andrew Dolloff. *Riparian Management in Forests of the Continental Eastern United States*. Boca Raton, FL: Lewis Publishers, 2000. [https://www.nrs.fs.fed.us/pubs/jrnl/1999/nc\\_1999\\_mattson\\_001.pdf](https://www.nrs.fs.fed.us/pubs/jrnl/1999/nc_1999_mattson_001.pdf).

<sup>4</sup> Floch, Rick F. *Shovel Logging and Soil Compaction: A Case Study*. Master's thesis, Oregon State University, 1988. <https://ir.library.oregonstate.edu/concern/defaults/w9505519n>.

<sup>5</sup> Curran, Mike. "Harvesting Systems and Strategies to Reduce Soil and Regeneration Impacts (and Costs)." FERIC Special Report, no. SR-133 (1999): 75-111. [https://www.for.gov.bc.ca/ftp/rsi/external/publish/Soil Disturbance/Course development/Publications/HARVESTING STRATEGIES 1999.pdf](https://www.for.gov.bc.ca/ftp/rsi/external/publish/Soil%20Disturbance/Course%20development/Publications/HARVESTING%20STRATEGIES%201999.pdf).

<sup>6</sup> "Forestry Equipment Chassis Configurations." USDA - US Forest Service. Accessed February 22, 2019. <https://www.fs.fed.us/forestmanagement/equipment-catalog/chassis-config.shtml>.

<sup>7</sup> "Limit Residual Stand Damage and Maintain Your Reputation." *Construction.papemachinery.com*. June 19, 2017. Accessed February 22, 2019. <https://construction.papemachinery.com/blog/limit-residual-stand-damage-and-maintain-your-reputation>.

