BOARD OF FORESTRY AND FIRE PROTECTION
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April 7, 2020

MEMORANDUM

To: The Board of Forestry and Fire Protection

From: Board Staff

RE: Limitations on the use of ground-based equipment within 14 CCR §§ 914.2[934.2, 954.2] and 914.3[934.3, 954.3]

At the March 3, 2020 joint meeting of the Board of Forestry and Fire Protection's (Board) Forest Practice and Management committees, Board staff provided a brief update on the state of currently available scientific literature surrounding mechanical timber operations on steep slopes and made a request to the stakeholders present for any additional information on the subject. Since that time, Board staff have been engaged with additional review of available literature, regulations and guidance, as well as consultation with Dr. Hunter Harrill on the subject. Below, please find a summary of the results of these actions.

Equipment and Operations

Nearly all operational guidance which is available related to the use of tethered or other steep-slope harvesting machinery identifies that the machinery involved with these operations must be specifically designed and tested for such operations in order to yield the potential benefits, safety or otherwise. Section 6.4.1 of the New Zealand "Approved Code of Practice for Safety and Health in Forest Operations" states that "All [heavy equipment] using the assistance of a wire rope and/or winch shall be specifically designed, tested, demonstrated to be safe, and certified by a Chartered Professional Engineer to be safe when operated on steep slopes." In the "Best Management and Operating Practices for Steep Slope Machine Logging" developed by the Washington State Department of Labor and Industries (Technical Report Number 98-02-2019, June 2019) it is recommended to "[u]se [a Steep Slope Machine] that is designed or modified by the manufacturer or an [Registered Professional Engineer] specifically for tethered logging." Furthermore, given that most equipment failure through roll over is caused by an initial loss of traction resulting in an uncontrolled gain in momentum (Visser & Stampfer, 2015), it is critical that winch or cable equipment function automatically in order to secure equipment on steep slopes, and most machinery which is manufactured or modified for these operations incorporates such a feature (MacDonald, 2016).

It is worth noting that the development and implementation of steep-slope harvesting systems in New Zealand involved a nearly decade-long effort to reduce harvesting costs, fuel costs, and injuries while developing and commercializing new machinery for domestic and export sales, known as the "Steep Land Harvesting Programme". The language within the New

Zealand Code of Practices was developed in conjunction with these efforts and was the result of collaborative effort between stakeholders. The language as described above, as well as the other requirements of Section 6.4 of the New Zealand Approved Code of Practice, is the result of iterative revisions in order to address concerns regarding the scope of those guidelines, as well as the requirements themselves. Though the administrative regulatory requirements are not equivalent here to those of California, the resulting guidelines in New Zealand represent an effective and efficient work-product from a governing body engaged in a similar, albeit much larger, effort to that of the Forest Practice Committee.

Staff Recommendation

- Incorporation of similar equipment certification or design requirements into any future regulatory action related to the permitting of heavy equipment on steep slopes.
- Incorporation of requirement that equipment which relies upon cable or winch systems in order to assist, or provide traction, must be non-manually synchronized with the operation of that equipment.

Current Available Literature Related to Environmental Impacts

The majority of research that occurs related to mechanical timber operations on steep slopes tends to focus on the potential for improved safety and production of tethered logging systems. Currently, there seems to be consensus that these systems can improve worker safety (Bonauto et al., 2019; Green, 2019) and appropriate implementation of these systems can potentially improve relative productivity in certain applications (Cavalli and Amishev, 2017, Evanson et al., 2013, Garland et al. 2019.).

Regarding environmental impacts, it appears that while some steep slope mechanical operations utilizing certain specially modified or constructed equipment result in slightly greater soil disturbance than cable yarding (Evanson et al., 2013), these operations are likely to have less soil disturbance than other harvest types (Green, 2019; Chase et al. 2019) utilizing tracked machinery and the disturbance that does result is often below regulatory concern (Chase et al. 2019). Though there is currently very little research on sediment delivery related to these operations, there is one ongoing study in Roseburg, OR which utilizes silt fencing at various locations comparing tracked feller-bunchers and traditional harvesting methods and has not identified a significant difference in sediment loading (Chung, unpublished).

Though the literature does provide a limited evaluation of environmental effects of steep slope mechanical logging, in order for the Board to fully assess the environmental impacts related to potential regulatory action, it will be critical to identify the potential environmental effects of these operations.

Staff Recommendation

- Identify the specific resource subjects which will be impacted by mechanical operations on steep slopes and conduct further research on those issues.
- Identify and catalogue where these mechanical operations on steep slope may affect other elements of the rules (i.e. cable vs. tractor unit size for even-aged units)

CAL FIRE Observations

On March 26, 2020, members of CAL FIRE forest practice staff and watershed team conducted a pre-consultation in Tehama County with Sierra Pacific Industries where SPI

intends to demonstrate a tether-assisted logging operation (2-17-051-TEH). Informal communication indicates that a case study may be produced around this operation and that the Department may be interested in engaging in similar efforts for proposed tethered operations in the near future.

Staff Recommendation

- Support and encourage the efforts of CAL FIRE
- Request any feedback or results as they may become available

Mechanical Site Preparation in the Southern District and Terracing

14 CCR §§ 954.2(j) and (k) currently limit mechanical site preparation in the Southern District on any slopes over 40%, and slopes less than 40% in certain specific conditions. There is, however, an exemption from these limitations within 14 CCR § 952.4(j) for those situations in which terracing will disturb less than 50% of the soil surface. Considering that operational limitations for ground-based operations within the Southern District which are not mechanical site preparation have much more relaxed standards, it may be appropriate to maintain consistency of operational restrictions. Furthermore, terracing is an extremely uncommon and outdated practice and its use may not be appropriate with modern timber harvesting practices and regulations.

Staff Recommendation

- Consider elimination of exemption for terracing activities.
- Consider revision of Southern District rules for operational consistency.

*****Full citations available upon request