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Mr. Roger Briggs, Executive Officer
Regional Water Quality Control Board
Central Coast Region
895 Aerovista Place, Suite 101
San Luis Obispo, California 93401

Dear Mr. Briggs:

The California Department of Forestry and Fire Protection (CDF) has reviewed the Central Coast Regional Water Quality Control Board's (CCRWQCB) "Proposed Timber Harvest Monitoring and Reporting Program" (Staff Report for Board Meeting of February 10, 2005) and would like to offer comments that we believe would improve the process. In general, we commend you and your staff on the efforts expended in developing an approach for determining monitoring requirements based on increasing risk associated with individual Timber Harvesting Plans (THPs) in the Central Coast Region. We know that your Board was generally supportive of the approach presented at its meeting held on February 10th in Salinas and that staff was directed to solidify the empirical nature of the matrix values and thresholds. Similar to your Board, CDF supports a process that is simple, clear and transparent to the regulated parties, interested public and responsible agencies. We are looking forward to assisting in any way we can to ensure your final program provides a clear and defined process allowing for more consistency in application as well as objective certainty. We offer the following specific comments to help your staff complete these tasks, based on past published research, our CDF/ Board of Forestry and Fire Protection (BOF) / Monitoring Study Group (MSG) monitoring results over the past decade, and our professional experience.

Comments on the Three Risk-Based Categories

First, we have several comments regarding the **Cumulative Effects Ratio (CER)**. In its current form, it is calculated by simply adding the acres harvested in the past decade in a planning watershed, plus acres in a proposed THP, and dividing the total by the total acres in the planning watershed. This approach assumes that past management impacts all acres equally, when clearly this is not the case. Beschta and others (1995) summarized cumulative effects knowledge related to forestry operations in Oregon and concluded that using harvest levels as a surrogate for impacts is a simplistic approach that does not account for regional or watershed variability, harvest location, yarding system, roading, etc., and assumes a direct causal relationship between size of the harvested area and magnitude of impact without regard to other factors, when this is often not the case. Vast amounts of watershed literature supports the conclusion that tractor logging, roading near streams, and broadcast burning

produces greater water quality impacts when compared to aerial-system yarding, roading near ridge-tops, and selection logging without harsh site preparation treatments (see for example Rice and Datzman 1981, Cafferata and Spittler 1998, Lewis 1998, Lewis and others 2001).

The CCRWQCB document specifies that a CER value of greater than 15% equates to a rating of high. In our opinion, insufficient research has been conducted to conclude that this is the proper value for Central Coast watersheds. Ligon and others (1999) wrote in their Scientific Review Panel Report that that the environmental community advocated a maximum harvest of 10% to 15% per decade, but that the Scientific Review Panel suggested a value from 30 to 50% per decade as a "red flag" (not a moratorium), but this would depend on factors such as geology, harvest prescriptions, past disturbance, etc. Instream monitoring work completed by the US Forest Service Pacific Southwest (USFS-PSW) and CDF over the past 40 years sheds some light on this issue. Harvesting of approximately 45% of North Fork of Caspar Creek with clearcutting in three years did not cause large changes in watershed physical or biological variables in a moderately stable geologic formation (Ziemer 1998, Lewis 1998, Cafferata and Spittler 1998, Nakamoto 1998, Bottorff and Knight 1996).

Past, largely office-based, watershed assessment work has often utilized indices such as road density, riparian road density, stream crossing density, inner gorge as a percent of total area, SHALSTAB (percent of road network in high and chronic categories), SHALSTAB (percent of total area in high or chronic categories), amount of area with deep-seated or slow moving landslide features, etc. (CDF 1999). These are more meaningful variables in estimating watershed risk for sediment production than simply the amount of area covered in a given decade.[1]

The CCRWQCB document uses Klein's (2003) report on turbidity associated with logging and roading to justify the 15% threshold. It states that Klein's report suggests that there are thresholds of harvested acres beyond which additional harvesting will cause large water quality problems. Beschta and others (1995) write that natural systems rarely recognize discrete thresholds and can respond incrementally and interactively to change. Mr. Klein states in his report that that while turbidity levels might be decreased by reducing the density of roads in a watershed and limiting the annual rate of timber harvest, his "*results should be considered preliminary and not be used alone for policy decisions or regulatory standards"* (italics added). He also wrote that while his study argues for quantitative limits on annual harvest rates, they should be "*perhaps customized to accommodate the variability in erosional sensitivity found within the northcoast. But a stronger analysis, one that includes a greater sample size of northcoast streams, is needed to establish defensible harvest rates that ensure protection of beneficial uses*" (italics added). We believe that insufficient work has been completed in Central Coast watersheds to determine that a CER of 15% in one decade would place a watershed in a "high" category.

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[1] Note that this list is only a partial list of potentially important variables related to sediment production that can be categorized in a spreadsheet.

Additionally, Mr. Klein's work on turbidity was completed prior to the work that CDF helped fund on suspended loads and stream health with Drs. Madej, Wilzbach, and Cummins and their graduate students (Madej and others, in press; Hadden and others 2004). This work provides new information regarding impacts of suspended load (both organic and inorganic) on fish feeding behavior and macroinvertebrate impacts. Graduate student Samatha Hadden (Hadden and others 2004) reported that both field and laboratory studies reveal that while the foraging efficiency of juvenile salmonids was decreased by increased turbidities, fish continued to capture prey at turbidity levels in the range of 40-50 NTU's.

In general, the CER methodology seems to be a much simplified Disturbance Index (DI) or Equivalent Roaded Area (ERA) type approach. Numerous problems with the standard ERA method have been reported in the past. For example, MacDonald and others (in press) states that that this approach does not explicitly separate changes in flow from changes in sediment, there are excessively long recovery curves, the effect of an activity does not vary with its location in the watershed, and there is little validation at site or watershed scales. McGurk and Fong (1995) found that a modified ERA indexing management impacts close to watercourses correlated to in-stream parameters, but the standard USFS Equivalent Roaded Area (ERA) index across whole watersheds did not. They reported that the standard ERA technique was uncorrelated to aquatic macroinvertebrate diversity, but that the modified ERA, restricted to within 100 meters of first and second order streams, was correlated.[2]

Additionally, the degree of impact logging operations have in a given watershed will depend on how well the Licensed Timber Operator (LTO) implements the requirements specified in the plan and the Forest Practice Rules—a factor that cannot be accounted for in this spreadsheet approach. Rice and Datzman (1981) reported that operator performance may be as great a determinant of logging-related erosion as are site characteristics.[3]

- **For all these reasons, we suggest that the CER index be excluded from the Proposed Timber Harvest Monitoring and Reporting Program for tiering purposes until further research is conducted to produce a scientifically credible procedure and that alternatives be explored.**

Second, the newly defined "weighted" **Drainage Density Index (DDI)** is inconsistent with the scientific literature. The standard definition for drainage density is simply the total miles of any order stream divided by watershed area in square miles. Drainage density has been shown to be important for predicting sediment yield, and has often been used in combination with other variables to predict sediment yields through multiple regression techniques. Road density and drainage density (number of

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[2] In McGurk and Fong's (1995) analysis, a % ERA of 15 percent inside the 100 m buffer strip represented the point at which the Shannon-Weaver Biodiversity Index for in-stream invertebrate diversity dropped by 50 percent.

[3] This indicates the importance of CDF, CCRWQCB and RPF active compliance inspections.

streams/unit area) has been used in the past as a surrogate for watershed condition (Jones and others 2000). More roads and more streams equate to more interactions between them (i.e., stream crossings), and stream crossings have recently been shown to be high-risk sites for sediment delivery in both quantitative and qualitative monitoring studies conducted in California (MacDonald 2002, Cafferata and Munn 2002). Sediment generation at crossings is not dependent on the watercourse class present. For example, in the Lake Tahoe basin, studies have shown a correlation between drainage density and road density, and the relative sediment loading to a watershed (Hill and Nolan 1990; Reuter and Miller 2000). Drainage density and road miles together explained 83 percent of the variation in sediment yield in the Tahoe basin. Drainage density was the most important variable for explaining sediment yield ($r^2 = 0.77$), but adding road density improved the correlation with sediment generation.

- **We suggest using a standard definition for drainage density (without weighting for watercourse class, simply mi/mi^2). This index is supported by watershed research in California.**

Last, the **Soil Disturbance Factor** described in the document seems to be cumbersome, and would require field validation to determine its worth. It appears likely that individual Registered Professional Foresters (RPFs) would use this procedure differently. Important factors for sediment that do not appear to be accounted for in this type of approach include: having or not having a valid mass wasting avoidance strategy; having or not having an aggressive road management plan and implementation timeline, having or not having adequate road maintenance. These types of approaches are proving to be important for reducing sediment inputs on PALCO timberlands in the highly contentious Elk River watershed (PALCO 2004).

At this time, we are not aware of a readily available "desk-top", office-based methodology for rating the hazard of sediment yield to watercourses that can take into account both surface and mass wasting erosion processes. The WEPP Forest Road Erosion Predictor and Disturbed WEPP models can estimate surface erosion alone for very small areas (Elliot and others 2000), but would not account for landsliding potential, a dominant erosion process in the Santa Cruz Mountains.

We are willing to work with your staff to develop a technique to use for estimating the hazard associated with a given timber operation. Input from the California Geological Survey for this revision would also be valuable.

- **We recommend not using the existing version of the Soil Disturbance Factor, and working with CDF and CGS staff to produce a scientifically credible revised Soil Disturbance Factor.**

Comments on the Monitoring and Reporting Program

In general, it appears to us that instream water column water quality compliance monitoring will be triggered too frequently with this Monitoring and Reporting Program for Proposed Conditional Waivers in our opinion. We have stressed to the CCRWQCB in the past that THP-scale sediment monitoring should focus on locating problem areas in a timely manner and correcting them if possible, not instream water column monitoring (Cafferata 2004).

We have informed the CCRWQCB that without adequate pre-project turbidity data (which may mean several winters of data collection[4]), only turbidity measurements taken above and below crossings are meaningful. USFS-PSW Mathematical Statistician Jack Lewis reported this concept at the Interagency Water Quality Monitoring Workshop held in Santa Rosa in 2002 (North Coast Regional Water Quality Control Board (NCRWQCB) and CDF 2002).

Monitoring and Reporting Program requirement D.2, Turbidity, requires turbidity measurement above and below crossings, and says that "Turbidity monitoring may be required as determined by the Regional Board Executive Officer if no newly constructed or reconstructed crossings exist within a proposed THP and the plan has activity within a Class I or II Watercourse Lake Protection Zone (WLPZ)." This appears to be open-ended and will not provide assurance to landowners regarding monitoring requirements. We have previously reported to the CCRWQCB that instream monitoring to determine changes in sediment loads and turbidity directly related to a THP is essentially a research level project (Cafferata 2004).

- **We recommend removing turbidity measurements, other than those taken above and below watercourse crossings, since adequate pre-project data will not be available to make meaningful comparisons with post-harvest data.**

As stated in previous correspondence with you, we support visual (or hillslope) monitoring, and forensic monitoring to locate and correct sediment-producing sites in a timely manner if possible. These types of monitoring, along with compliance/ implementation monitoring by CDF, CCRWQCB and/or the landowner are appropriate for a general waiver process.

We believe that the sediment release reporting requirement of 1 cubic yard of soil will be very difficult to achieve in the field. Our previous comments to the CCRWQCB have indicated that 5 cubic yards delivered to a watercourse is more appropriate. The requirement for the plan proponent to implement a "road inventory program" within the plan area is appropriate and valuable.

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[4] Even with several winters of data, scientists such as Dr. Lee Benda state that we will not know true background levels in watersheds subject to episodic landsliding events.

- **We recommend changing the sediment release monitoring requirement to 5 cubic yards of delivered material to a stream channel, rather than 1 cubic yard.**

Water temperature monitoring is probably not necessary in almost all cases due to the very high canopy requirements in effect through the implementation of the Threatened and Impaired Watersheds Rule Package, part of the current Forest Practice Rules. In the few cases where water temperature monitoring is deemed necessary, it can be accomplished relatively easily with small, electronic recording dataloggers. This type of monitoring is most appropriate if harvesting has occurred in a Class I watercourse WLPZ within watersheds that have been declared as temperature impaired through a 303(d) listing. However, relating these measurements to THP impacts should also include collecting pre-project background data.

- **We recommend limiting THP-related water temperature monitoring to Class I watercourses, and primarily to those Class I watercourses with proposed harvesting in the WLPZ and which are 303(d) listed as impaired for water temperature.**

In summary, we believe there is strong scientific evidence to support the adoption of the changes contained in our six recommendations above. Incorporating these six recommendations will make the Central Coast Regional Water Quality Control Board's "Proposed Timber Harvest Monitoring and Reporting Program" more effective in protecting water quality and much more defensible, scientifically. We emphasize the need for a program that can be easily understood and applied by Registered Professional Foresters during the preparation of timber harvesting plans. This will ultimately result in more effective land management planning for timberlands within your region and in expedited review of timber harvesting plans, benefiting your regional staff, our THP review staff and the plan submitter as well.

If you would like to discuss any of these points in greater detail, please do not hesitate to contact us.

Sincerely,

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By
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