BIG CREEK
"Growing Redwoods for the Future"

May 17, 2005

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

RE: Eligibility Criteria (EC) and the Monitoring and Reporting Program (MRP) for the Proposed General Timber Harvest Waiver for the July 8, 2005 Board Meeting

Dear Mr. Briggs:

Over two years have passed since the expiration of the general waiver. Since that time Big Creek and many other stakeholders have expended a tremendous amount of time and resources to achieve a fair and viable waiver process. We believe the regulations in place under the Forest Practice Rules are protective of water quality and that there is little evidence to suggest that Proposed General Timber Harvest Waiver will provide better protection for water quality and compliance than the 2002 expired General Waiver. As part of this communication we have included a letter by Dr. Robert R. Zeimer (Retired Chief Research Hydrologist, USFS RSL) along with other pertinent comments made to the Central Coast Regional Water Quality Control Board (CCRWQCB).

Most expert testimony suggests little, if any, scientific justification for the EC (see recent Zeimer, Jackson, Harris and Cafferata letters). Shortcomings of the EC have not been disclosed. A recent court ruling noted in Dr. Zeimer's letter suggests that:

> "such models are acceptable so long as there are clear and up-front disclosures of relative shortcomings in the data or models."

The lack of scientific justification and lack of disclosure strongly suggests that the EC should only be used "in house" to help Board Staff prioritize what projects need additional review rather than using it as a criteria to determine what level of monitoring is appropriate. Determining levels of monitoring should only be done site specific basis.

As for the MRP, determining the effects of timber harvesting should be left to those studies equipped to do so, and not to one group of heavily regulated stakeholders. At least two cost analyses have been provided to CCRWQCB that show the MRP to be burdensome. In some cases, landowners are unable to manage their forests because the MRP costs will eliminate potential net return. Experts suggest (Zeimer, Cafferata, and Jackson) that components of the MRP have not been proven effective to answer the questions that CCRWQCB intends to answer. Discussion of system variability in watersheds, and how to measure them, dominate dialogue on watershed assessment (See Water Quality Conference II in Redding, CA). How can landowners pay for a MRP that does not "bear a reasonable relationship to the benefits obtained

from it" (Water Code Section 13267 (b)(1))? How does that reasonable relationship correlate to all users in the watershed?

Turbidity

Turbidity measurements at newly constructed or re-constructed crossings require consideration of the watershed area as the major component to the validity of turbidity measurements. The explanation is simple and has been substantiated by Dr. Zeimer in his March 11, 2004 letter regarding the Smelt-Locatelli Timber Harvest Plan (THP) to CCRWQCB:

> "R2 is a concrete bridge where there is a short steep pitch of road on the north side that drains to Gamecock Creek between the designated monitoring points. There is perhaps more than 800 acres of the Gamecock watershed that drains to both of these points and perhaps 0.1 acre between the monitoring points. This represents an increase in area between the monitoring points of 0.01%. Unless there was an extraordinary amount of sediment introduced, stream turbidity measurements would never show a difference. Such a large input of sediment would be obvious to an on-site observer and the volume of erosion could be measured easily. "

Dr. Zeimer's point applies to every crossing in the forest and substantiates the importance of visual monitoring. The variability surrounding turbidity measurements and the protection of water quality and waiver compliance facilitated by visual inspections by foresters/landowners, post harvest inspections by Board Staff/California Department of Forestry and Fire Protection (CDF)/California Geologic Survey (CGS), and sediment release reporting for the life of the waiver will be more than sufficient to protect water quality, determine waiver compliance, and alleviate the need for turbidity monitoring.

Photo-Point Monitoring

We believe that photo-point monitoring on newly constructed and re-constructed crossings of Class I and II watercourses is appropriate. However, the waiver is structured so that one crossing could be photo documented three times in the first year of operations and up to six times if the crossing is temporary. The crossing is again photo documented in years two and five. A more reasonable approach would be one photo set following the completion of timber operations for that year and one photo set in year five to determine compliance.

One photo set in years one and five, visual inspection by foresters/landowners, post harvest inspections by Board Staff/CDF/CGS, and sediment release reporting for the life of the waiver will be more than sufficient to protect water quality and determine waiver compliance.

Temperature

CCRWQCB has been provided with temperature data and supporting information by Big Creek Lumber Company, CDF, Dr. Richard Harris, and Redwood Empire demonstrating that temperature monitoring is unnecessary and unwarranted. Temperature in Scotts Creek has annually fluxuated approximately 1/10th of a degree, on average, over the last six years, hovering around 58 degrees. The two most recent years of temperature monitoring followed a

four hundred acre timber harvest utilizing canopy retention requirements under the Forest Practice Rules, which still showed no effect.

We believe temperature monitoring for THP's or operational areas of an NTMP adjacent to a 303(d) listed Class I stream segment designated as "temperature impaired" is appropriate.

Sediment Release Reporting

The Central Valley Regional Water Quality Control Board (CVRWQCB) oversees approximately 50% of the timberland in California and requires sediment release reporting of 10 cubic yards or greater. As Dr. Zeimer states in his letter:

> "An evaluation of Erosion sources at Caspar Creek for the 18 year period from 1986-2003 found that only 2.7% of the erosion was from sources less than 5 cubic yards. Only 4.3% of the erosion came from sources less than 10 cubic yards. 18% came from sources between 10 and 100 cubic yards; 18% between 100 and 500 cubic yards; and 61% from sources greater than 500 cubic yards."

What this suggests is that the major sources of sediment come from the large stochastic events. Similarly, the Technical Advisory Committee on Forest Geology in their technical review report of the "Empirical Methodology to Assess Slope Stability and Sediment Production" stated the following estimate about the San Lorenzo River:

> "The average amount of bed load has been estimated at about 30,000 to 40,000 cubic yards/year. During the winter of 1981-82 approximately 400,000 + cubic yards were delivered to the Pacific Ocean. During the winter of 1982-83 another 400,000 + cubic yards were delivered to the Pacific Ocean."

All experts with reasonable knowledge of forested watersheds echo similar comments about the input of sediment to stream systems related to stochastic events.

Dr. Zeimer also discussed quantifying discharges less than 10 cubic yards in his March 11, 2004 letter, regarding the Smelt-Locatelli THP, to CCRWQCB:

> "This seems to me to be an exceedingly small feature. At Caspar Creek, we walk the streams and maintained a log of observations of new erosion features having a volume of 10 cubic yards or greater. Our experience with field crews is that there is no consistency in the ability to find and report features having smaller volumes."

Dr. Richard Harris's comment is similar:

> "Sediment Release reporting on quantities of one cubic yard seems a bit optimistic. In our work with the Department of Fish and Game, we have found that it is difficult to estimate quantities of less than 5-10 cubic yards."

CDF states something comparable:

> "We believe that sediment release reporting requirement of 1 cubic yard of soil will be difficult to achieve in the field."

The position that CVRWQCB has taken on sediment release reporting demonstrates some continuity with two agencies and two experts and suggests that a reporting requirement of 5-10 yards is more appropriate.

As many of our previous comments have pointed out (see our letter dated February 2, 2005), the most important thing that can be done to protect water quality and assure waiver compliance is visual effectiveness monitoring. Visual monitoring, continued agency involvement in the THP process, and pre and post-harvest inspections combined with timely maintenance are sufficient to ensure water quality and waiver compliance. The EC and the costly MRP currently proposed by the general waiver are unlikely to increase the beneficial uses of water or waiver compliance. Furthermore, the Proposed General Timber Harvest Waiver will present an undue economic hardship for many small forest landowners throughout the Board's region.

Sincerely,

Janet M. Webb

Janet M. Webb
Chief Forester
RPF #2347

Comments on

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD CENTRAL COAST REGION, STAFF REPORT FOR REGULAR MEETING OF July 8, 2005, PROPOSED GENERAL TIMBER HARVEST WAIVER (PGTHW)

Central Coast Region PGTHW is specifically directed toward timber activities and water quality. However, the basic issue is the effect of land use activities on water quality. This represents the classic example of cumulative effects. A cumulative effect related to water quality is not an issue exclusively focused on a single activity such as timber harvest, but should evaluate the impact of all potential sediment producing activities in the watershed, including ranching, agriculture, housing developments, county and state road construction and maintenance, etc. I suggest that the Board follow the guidance of the Council on Environmental Quality in their interpretation of the National Environmental Policy Act, which states Cumulative impact is the "*impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*" (CEQ Guidelines, 40 CFR 1508.7, issued 23 April 1971).

Eligibility Criteria

Board PGTHW develops Eligibility Criteria and uses three "risk-based categories": Cumulative Effects Ratio, Drainage Density Index, and Soil Disturbance Factor. Page 3 of Board PGTHW states: "*The numeric ranking is simple and allows for more consistency and objective certainty. The numeric ranking also creates a transparent process that is clear to both the regulated party and interested public. A clear and defined process is a necessary feature for regulatory action.*" I would add another necessary feature: The process should be based on sound science, which includes validation of results and rigorous peer review. The Criteria and the three "risk-based categories" are not based on sound science, have not been validated by field testing, and have not been subjected to independent scientific peer review.

Unfortunately, there is no description of or reference to the peer-reviewed science that produced these models. Because of deference to agency decisions, the courts generally have found that reliance upon such models is acceptable so long as there are clear and "*up-front disclosures of relevant shortcomings in the data or models.*" (August 13, 2004, Ninth Circuit Court of Appeals; Lands Council v Powell, 379 F.3d 738; 2004 U.S. App. LEXIS 16678; 59 ERC (BNA) 1070; 34 ELR 20073). See also the October 28, 2004, Ninth Circuit Court of Appeals; Klamath-Siskiyou Wildlands Center v. BLM, No. 03-35461; D.C. NO. CV-02-03062-HO Opinion. Unfortunately, in the case of the Eligibility Criteria there is no discussion of model development, testing, or shortcomings. In some cases, the proposed approach is inconsistent with the scientific literature. There are a number of alternative models that have been thoroughly documented and discussed in the literature. It would be preferable to use these previously tested approaches, including a disclosure of shortcomings, rather than to adopt a new set of untested assumptions.

The Cumulative Effects Ratio, specifies "Acres Harvested in Planning Watershed in last ten years". As stated above, limiting the analysis to timber harvest is inconsistent with a water quality related cumulative effects analysis. It is reasonable to hypothesize that a greater the level of activity in any given watershed is likely to be, in some general way, correlated to a decrease in water quality. It is less likely, however, that any specified relationship would be the same for all watersheds and for all activities. For example, activity in watersheds having a stable geology would not produce the same response as an identical activity in highly unstable erosive watersheds. Activity near a watercourse would not produce the same response as a similar activity near the ridge. Further, the distribution, timing, and amount of all land disturbing activities in the watershed needs to be included, not limited to timber harvest. There needs to be some detailed explanation about the selection of the 10-year period, including a citation of the peer-reviewed science that recommended these criteria. A 10 year period may or may not be a technically appropriate cutoff for evaluating cumulative watershed effects. The appropriate time relationship is dependent on the processes by which sediment is delivered to and transported by the stream. For example, the contribution of roads to stream sediment can last for decades and sediment inputs can be periodically increased with continued maintenance, or lack thereof. Stream crossings fail as the flow from large storms exceed the design capacity, become clogged with debris, and/or materials deteriorate with age. The contribution of tree roots to soil strength has been shown to decline to a minimum about 9 to 15 years after logging, depending on location and species. For areas having relatively non-cohesive soils and non-sprouting tree species, a strong correlation has been reported between the loss of root strength and accelerated landsliding. In areas having cohesive soils, there is a smaller relative contribution of root strength to soil strength. Further, for selective partial cuts and for sprouting species, such as redwood, the total reduction of root strength for an area may be of less concern.

Central Coast Region PGTHW makes reference to and apparently relies upon an unpublished report by Randy Klein, submitted in March 2003 to the USEPA Region IX and an oral presentation at a Timber Workshop in June 2004. Turbidity data are notorious for being error-ridden, as Klein briefly discusses in his report. I was unable to verify whether the data used by Klein were appropriately "*sanitized*" (using his terminology), because the I do not have access to the raw and sanitized data files that he states "*are provided in electronic form with this report*" (page 11). In addition, Klein concludes (page 24), "... *these results should be considered preliminary and not used alone for policy decisions or regulatory standards*" and further "... *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*". There are a number of statistical problems with Klein's analysis. Klein describes the highly variable characteristics of the eight basins that he used. Watershed area ranged from 2 to 64 mi^2, several watersheds represent snowmelt runoff, bedrock ranges from erosion-resistant to highly erodible and particularly sensitive to disturbance, rainfall differences were assumed to be zero, land use varies from relatively pristine to varied combinations of logging, grazing, roading, and urbanization. The appropriate land-use variable would include all land disturbing activities, weighted by their connectivity to the stream and a relationship between time after disturbance and recovery from that disturbance. Yet, the analyses presented by Klein are simple bar graphs, bivariate plots, and simple linear regression (two-variable

models). Based on the information provided in Figures 12 and 13, it is obvious that both the regressions of turbidity exceeded 10% of the time vs harvest rate or road density are dependent on a single outlier (FTR). Without that single point, the slope of the line would clearly not be significantly different from zero for harvest rate, and a very weak positive correlation with road density. It is interesting to note that two adjacent watersheds having the same geology NFC and SFC showed equal turbidity despite large differences in the harvest rate and road density variables. A very different conclusion would likely emerge if a more robust analysis had been conducted, such as a multiple regression analysis considering covariates of geologic erosivity and sediment particle size, basin size, additional land uses, etc. It is only in this manner of including compounding physical influences that potential correlations with land use can be teased out. Unfortunately, to conduct a convincing analysis, a much larger data set would be required. Klein's report points out some interesting differences in turbidity between watersheds and suggests some potentially interesting inferences, but his analysis is far from convincing.

The Drainage Density Index proposed by Central Coast Region PGTHW is a unique index that is not consistent with the technically acceptable terminology. Drainage Density is usually defined as the length of stream channel per unit area of drainage basin. The scientific literature suggests that there is often a positive correlation between drainage density and erosion, but this relationship is highly dependent on geology. The proposed drainage density index calculated by weighted stream class appears to be an untested hypothesis. Further, there is no justification provided as to why a threshold of 100 was selected to separate the high and low categories. As with the Cumulative Effects Ratio discussed above, the proposed Drainage Density Index should be supported by peer reviewed science and field testing before it is adopted as a regulatory requirement.

The Soil Disturbance Factor appears to be another example of developing an untested model that might produce results useful in predicting land use effects on water quality. There have been numerous models developed and field tested that have contained similar variables as those proposed by Central Coast Region PGTHW. However, unless the proposed variables, weighting, and thresholds are evaluated by rigorous field studies, it is not possible to determine whether the calculations produce results that are related to degraded water quality. Further, there are a number of variables that are missing from this proposed calculation, such as interaction with unstable terrain and mass erosion, management and maintenance of roads, proximity and connectivity of activities to streams, etc. In addition, as with the Cumulative Effects Ratio, limiting the calculations to timber harvest does not provide an adequate evaluation of land use effects on water quality.

Monitoring and Reporting Program

The monitoring procedures are not described in PGTHW in sufficient detail to allow specific comment. However, monitoring activities such as those suggested in Sections B and C would require a significant effort to develop and to field test procedures before providing useful information. Section C states that the "*issue paper to discuss the need for monitoring*" and the specific methodology have not yet been developed. Also, the "*data evaluation tools*" have not yet been evaluated. Further, as discussed above, if the objective of the monitoring and

reporting program is to protect water quality and associated beneficial uses and to assist in assuring that land use activities do not further water quality degradation, then the program must be applied to all activities within the watershed of concern, not just a selected subset of those activities, such as timber harvesting.

Attachment 2, SectionII.b. Reporting is required "*Whenever at least one cubic yard of soil is released to a waterway due to anthropogenic causes or at least five cubic yards of soil is released to a waterway due to natural causes, or when turbidity is noticeably greater downstream compared to upstream ...*" This suggests that connectivity to a waterway is the determining criteria. Consequently, one would infer that the failure of a road or skid trail that deposits material, irrespective of volume, to a stable location that is not connected to a waterway would not require documentation or reporting. My experience in observing post-storm hillslope and channel erosion at Caspar Creek is that it is highly unlikely that a field crew can identify a generic one cubic yard sediment source. It is less difficult to identify a one cubic yard gully. In any case, converting the volume of void on the hillslope to the volume of soil delivered to a waterway is not easy. For channel bank failures or instream sources, this is even more problematic. It is not uncommon for the movement of an in-channel piece of woody debris during a storm to release one cubic yard of channel stored sediment. I found that our trained field crews had difficulty identifying fresh sediment sources less than five cubic yards occurring in or adjacent to stream channels. It is interesting to note that the March 2005 Central Valley Regional Board draft Order No. R5-2005-**** sets a threshold sediment release of 10 cubic yards of sediment to watercourses.

Channel and bank erosion are the dominate sources of pre- and post-logging sediment at Caspar Creek. An evaluation of erosion sources at Caspar Creek for the 18-year period from 1986-2003 found that only 2.7% of the erosion was from sources less than 5 cubic yards. Only 4.3% of the erosion came from sources of less than 10 cubic yards. 18% came from sources between 10 and 100 cubic yards; 18% between 100 and 500 cubic yards; and 61% from sources greater than 500 cubic yards. These volumes are erosion sources, not volumes delivered to watercourses. Generally, the larger the source volume, the more likely that sediment will be delivered to the watercourse. The large effort to find, document, and report the numerous small features that represent such a small proportion of the potential contribution to degraded water quality seems unwarranted. Alternatively, a concerted effort to first assure that effective erosion control practices are implemented, followed by a vigorous effort to identify and rapidly correct places of serious erosion, would be much more effective in protecting water quality than requiring documentation of numerous small features that contribute little to the water quality problem.

Historically, monitoring is expensive, time-consuming, and too frequently produces no useful or meaningful information. Any person or agency that requires or embarks on a monitoring program must recognize that unless the program is well-designed and well-executed, there will be a low probability of success. My experience is that most monitoring programs historically succeed or fail due to one or a combination of the following:

1. A clear and detailed statement of the monitoring objective, including a precise description of what will be measured, where it will be measured, when it will be measured, why it will be measured, how it will be measured, and by whom it will be

measured – including a detailed discussion of how these measurements will be used to address (solve) the stated monitoring objective;

2. Successful selection of appropriate locations, instrumentation, data timing, frequency, and duration required to adequately address the objectives described in (1);
3. Successful completion of required data collection, data validation and archiving, data analysis, and final report that fully answers the objectives described in (1), including a detailed and objective outside review of all of the data, processes, interpretations, and conclusions;
4. Agreement that the monitoring objectives and results clearly meet the expectations and requirements of those, both internally and externally, responsible for judging the success or failure of the program.

Every one of these four items must be thoroughly and satisfactorily addressed if the monitoring program is to be successful. Board PGTHW is deficient in addressing these criteria. Only when these monitoring procedures are fully developed by the Board, would it then be the appropriate time for economic analysis and rigorous scientific peer review before implementation.

Assessment and Trend Monitoring. I concur with the decision on Page 6 (B.3. last paragraph) that it is appropriate that assessment and trend monitoring not be included in this proposed monitoring and reporting program. An individual discharger generally does not have the commitment, time, funding, or technical competence to meet the conditions necessary to conduct such monitoring. In addition, the land owner generally does not have the large spatial or temporal view that is required to understand the relevance of short-term observations or measurements made within their ownership. It is even rare to find success stories in well-funded and well-staffed governmental agencies. Assessment and Trend Monitoring is vitally important, but it is not something that is easily accomplished even under the best of situations. The regulatory agency should be responsible for developing that contextual understanding of the larger and longer scale issues.

Attachment 2b "Standard Operation Procedure 5.2.3 – Photo Documentation Procedure". Although there is detail provided about how and where to take photographs, it is not clear exactly how this information might be designed, stored, retrieved, or used to evaluate sediment input to streams. It has been clearly documented in the scientific literature that most of the erosion is produced from a few sites and also that most of the area produces little or no erosion. This means that there is a low probability of successfully selecting, in advance, a site to monitor that will in the future be a significant source erosion from the area. For example, one or several discrete landslides, road fill failures, or streambank failures will likely be the principal erosion and sediment story for an area. Predicting where these might occur and establishing photo points at the appropriate locations before the event is extremely difficult. Even if the photo point could somehow be established in the approximate area and the actual failure is say 10 feet to the right or left, the feature will probably not be seen in the photo coverage. Even if a photo point happens to adequately cover an erosion feature, there remains the problem of interpreting the respective photos to determine the volume and the disposition of erosion shown. My personal experience is that I have not found ground photo points established in advance of anticipated erosion, or even after the erosion event, to be an effective way to evaluate erosion or sediment in an area. Repeated large scale aerial

photography is much more likely to provide an opportunity to identify and measure significant erosion sources, because it covers the entire area and allows one to focus on the area of subsequent erosion. Further, calculating the volume of erosion is improved using stereographic coverage.

If the issue of concern is degraded water quality, a regulatory agency should first identify the relative contribution of each tributary within the drainage basin to degrading water quality and then identify the specific processes and sources of that degradation. This can be accomplished simply by the regulatory agency collecting grab turbidity samples at each tributary junction and the adjacent main stem throughout the basin following large storms or other appropriate times of concern. This information, requiring a relatively small effort to collect, should be displayed on a map of the basin. Such a display should demonstrate to any reasonable observer the relative magnitude and duration of the sediment issue in various portions of the basin of concern and directly focus monitoring efforts within those areas and upon those processes having the greatest contribution to the water quality concern. Thus, the monitoring is not directed at a preconceived area or a particular land use, but at those areas and conditions that have produced, are producing, or are likely to produce the water quality degradation, irrespective of ownership or type of land use. Thus, the burden of monitoring is weighted toward those locations within the watershed having a demonstrable problem and borne by the principal dischargers.

Small streams tend to clear much more rapidly than large streams. As one travels downstream from headwater tributaries to progressively larger watersheds, turbidity levels tend to become higher and remain longer. Some fish biologists believe that the health or condition of fish is related to both the magnitude of turbidity and to the length of time that turbidity remains high. There is some evidence that fish begin to have difficulty feeding at turbidity greater than 25 NTU and feeding success reduces as turbidity increases. Feeding tends to shift from drift to benthic organisms as turbidity increases and corresponding visibility decreases. Feeding tends to stop when turbidity exceeds 100 NTU. Studies suggest that the important variable is not a threshold of turbidity, but a shift in magnitude/duration relationship, which can result in a reduction of fish growth and condition, and potential survivability. Consequently, a regulatory variable should be one that is supported by the biological response of the organisms being protected.

Robert R. Ziemer, PhD
May 10, 2005