

Response to Comments
on
Proposed ORDER NO. R1-2016-0004
Waste Discharge Requirements

For

Nonpoint Source Discharges and Other Controllable Water Quality Factors Related to
Timber Harvesting and Associated Activities Conducted by Humboldt Redwood
Company, LLC in the
Upper Elk River Watershed

Humboldt County

Prepared by:
Staff of the North Coast Regional Water Quality Control Board
November 30, 2016

Procedure

On August 30, 2016, the North Coast Regional Water Quality Control Board (Regional Water Board or RWB) issued a Notice of Public Hearing and Intent to Adopt a mitigated negative declaration (MND) for Draft Order No. R1-2016-0004, Waste Discharge Requirements for Nonpoint Source Discharges and Other Controllable Water Quality Factors Related to Timber Harvesting and Associated Activities Conducted by Humboldt Redwood Company, LLC in the Upper Elk River Watershed, Humboldt County (draft Order). The Order is informed in part by the *Upper Elk River: Technical Analysis for Sediment* (Technical Report), which is a comprehensive assessment of sediment conditions and associated beneficial uses in the Upper Elk River Watershed.

On August 30, 2016, Regional Water Board staff submitted the draft Order, mitigated negative declaration (MND), and supporting documentation (i.e. Initial Study) to the State Clearinghouse for a 30-day CEQA review and assigned it SCH# 01582077. In addition, the Public Notice initiated the Regional Water Board's 30-day formal public comment period, which ended on September 29, 2016. The notice of the draft Order was distributed to the Regional Water Board's Lyris list, two newspapers in the Region (Press Democrat, Eureka Times Standard) and was posted on the Regional Water Board's website.

The Public Notice stated that Regional Water Board would conduct a public hearing to consider adoption of the Order and MND on November 30, 2016, at 9:00 a.m., in the City Council Chambers at the Eureka City Hall in Humboldt County or at the location to be announced in the Regional Water Board's agenda and on its website:

<http://www.waterboards.ca.gov/northcoast/>.

The initial public comment period for the draft Order was from December 4, 2015 to January 18, 2016. During that comment period, the RWB received and responded to comments from 20 individuals, representing state or federal agencies, environmental groups, residents, and other interested parties. The comment letters and staff's response to

comments are posted on the Regional Water Board's website. On May 12, 2016, the RWB began the public hearing to consider adoption of the draft Order. At that time, no vote was taken, but rather the RWB requested additional clarification from staff regarding: 1) details of required hydrology monitoring, 2) a comparison of riparian management zones (RMZ) proposed by HRC and the proposed Order, and 3) harvest rates proposed by HRC. On June 16, 2016, the hearing was continued for a second day and RWB staff provided the required information. Again, the RWB did not vote on the proposed Order. Based on comments made by RWB members and other interested parties, staff revised the Order and provided a second public comment period for the August 30th draft Order and MND. All previously received comments and prepared staff responses are part of the administrative record for this proceeding.

Substantive comments received during the August 30 to September 29, 2016 comment period are summarized below, followed by Regional Water Board staff response. Where commenters have made similar comments, those comments are summarized and a single response presented. Revisions to the April 7, 2016 proposed Order are reflected in the November 30th Proposed Order that will be considered for adoption by the Regional Water Board on November 30, 2016, and are highlighted in a "redline-strikethrough" version. Original copies of all written comment letters are attached to this document.

Comments received during the August 30, 2016 – September 29, 2016 Comment Period:

Kristi Wrigley, Elk River resident
Jesse Noel, Elk River resident
Jerry Martien, Friends of Elk River
Mike Miles, Humboldt Redwood Company (HRC)
Dennis Thibeault, HRC
Rob DiPerna, Environmental Protection Information Center
Vivian Helliwell, Pacific Coast Federation of Fishermen's Associations and Institute for Fisheries Resources
Ken Pimlott, California Department of Forestry and Fire Protection (CAL FIRE)

Overview

The November 30th Proposed Order retains the same overall framework as the April 7, 2016 proposed Order, namely:

- Harvest rates throughout HRC's ownership in the Upper Elk River (UER) that must be less than those allowed under the limits set under the current WWDRs;
- Use of partial harvesting methods that retain a significant component of post-harvest root strength;
- Limited timber harvesting in high risk subwatersheds;
- Riparian protection zones, which include no harvesting within 50 feet of Class I watercourses, 30 feet of Class II watercourses, 20 feet of Class III watercourses and specific post-harvest conifer canopy coverage within 150, 200, and 100 feet of Class I, II and III watercourses, respectively;

- Identification and treatment of controllable sediment discharge sources;
- Review by Professional Geologist (PG) of all proposed activities, including harvesting and construction or reconstruction of roads and watercourse crossings;
- Wet weather requirements;
- Implementation of HRC's Elk River/Salmon Creek Watershed Analysis (ERSC WA) hillslope management prescriptions;
- A requirement that HRC conduct a study to evaluate the feasibility of methods to control, trap, or meter out sediment from in-channel sources; and
- A robust hillslope and in-stream monitoring requirement.

Revisions made to the August 30th draft Order were made in response to comments from Regional Water Board members and other interested stakeholders. Revisions include both editorial, those changes intended to improve clarity but do not change requirements, and substantive changes. The following is a brief list of substantive revisions in the August 30th draft and November 30th Proposed Order, which are discussed in more detail below.

- Subwatershed ten year harvest limit (section I.B.3) - 2% equivalent clearcut acres averaged over any 10 year period in any subwatershed has been revised and is established as a threshold of concern rather than a fixed limit.
- Limited harvesting in high risk subwatersheds (section I.B.4.a) – The prohibition on harvesting in Clapp, Tom and Railroad Gulches, McCloud Creek and the Lower South Fork Elk River, subwatersheds identified as high risk of sediment discharge, has been revised to allow limited harvesting.
- Riparian Management Zones (section I.B.2-3) – Conifer canopy coverage within Class II and III watercourses remain unchanged. Proposed default widths (100 feet on Class III watercourses and 200 feet on Class II watercourses) for RMZs also remain unchanged, but the condition, “or to the hydrologic divide” has been added.
- Wet weather requirements (section I.E.2) have been revised so that specific timber operations, including hauling, may take place outside of high risk areas during extended dry periods (defined as less than 0.25 inches of rain during a 72 hour period) after 4 inches of accumulated rainfall have fallen from October 1 to April 30. Wet weather requirements for high risk subwatersheds have been revised so that timber falling may be conducted throughout the winter period in the five high risk subwatersheds.

Additional revisions have been made to the November 30th Proposed Order in response to comments received on the August 30th draft. Revisions include both editorial, these changes intended to improve clarity but not change requirements, and some new non-substantive changes. Revisions made in response to comments received are noted in staff's responses below and shown in the underline/strikeout version of the Proposed Order. Regional Water Board staff maintain that the Proposed Order is supported by the entire record and is necessary to support beneficial uses and meet water quality objectives.

Regulation of timber harvesting and actions to address severely impaired beneficial uses in the Elk River watershed has long been controversial and subject to strong disagreements. Similar to the previous comment period, this divide is reflected in the current comment letters, which can be categorized into two strongly opposing points of view; those opposing any additional logging, or only supporting logging under restrictions in the upper watershed more stringent than the Proposed Order while conditions remain impaired in the impacted reach; and those who maintain that HRC's current practices are adequately protective and that no additional upstream sediment control measures can affect meaningful improvements in the impacted reach, and that certain specific requirements of the Proposed Order are not warranted or adequately supported by the available science.

Many comments made during the August 30 – September 29, 2016 comment period duplicate previous comments. Where that is the case, the RWB staff's previous responses are duplicated in the responses below.

Responses to Specific Comments

- 1. Comment-** Mr. Thibeault of HRC “disagrees with the staff and EO with respect to the role of professional opinion in this process.” HRC asserts that “opinion itself does not impart regulatory authority to act” and that “[r]egulatory actions are governed by the processes and procedures put in place by this Board, the State Water Board, and the State Legislature.”

Response – The Proposed Order is issued pursuant to the Regional Water Board's authority to regulate discharges of waste under the Porter-Cologne Water Quality Control Act. (Wat.Code §13000 et.seq.) The State Water Resources Control Board and each Regional Water Board are the principal state agencies with primary responsibility for the coordination and control of water quality. (Wat.Code § 13001.) These waste discharge requirements, issued pursuant to Water Code section 13263, must implement the Basin Plan, take into consideration the beneficial uses to be protected, water quality objectives to achieve that purpose, and the need to prevent nuisance. In establishing appropriate waste discharge requirements for a non-point source discharge, the regional water board staff must exercise its professional judgment in establishing proposed requirements that will satisfy the factors listed above. In this case, many of the proposed requirements are Best Management Practices (BMP) that are necessary to achieve compliance with water quality standards. Best Management Practices can include structural and non-structural (operational) controls. They may be applied before, during and after pollution producing activities to eliminate or reduce the generation of non-point source discharges and introduction of pollutants into receiving waters. Successful MP (management practice) implementation typically requires: (1) adaption to site-specific or regional specific conditions; (2) monitoring to assure the practices are properly applied and are effective in attaining and maintaining water quality standards; (3) immediate mitigation of a problem where the practices are not effective; and (4) improvement of MP implementation or implementation of additional MPs when needed to resolve a deficiency. (State Water Board *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (2004)) In considering a proposed Order, Regional Water Board staff, the Executive Officer, and

the Board itself collectively deliberates in a manner that is public and transparent through a public process, and documented in the administrative record. Nonetheless, the Regional Water Board has the ultimate decision making authority using available scientific studies, reports, data, and evidence received during the public review and hearing on the Proposed Order and applies its own judgment to all the evidence in the record to establish appropriate discharge requirements that are supported by substantial evidence in the record. This information and resulting evaluation informs the regulation of sediment discharge to best protect beneficial uses in accordance with the federal Clean Water Act and Porter-Cologne Water Quality Control Act which the State and Regional Water Boards are required to implement.

- 2. Comment** - CAL FIRE contends that the rationales for extended riparian buffer requirements for Class II and III watercourses are “not sufficient or well-articulated enough,” suggesting that the requirements “do not have a clear process-based linkage to the resources and/or watershed processes of concern.” The rationales questioned are: moderating downstream flood peaks; preventing soil pipe and gully erosion; stabilizing channel banks; and the maintenance of robust riparian stands. CAL FIRE cites Reid et al (2010) and Buffleben (2010) when asserting that riparian protections would not be effective in reducing erosion resulting from peak flows in currently and historically managed watersheds for timber production. CAL FIRE also states that site-specific reviews during the THP review and inspection process and resulting recommendations are sufficient to address potential issues related to slope stability. Additionally, CAL FIRE interprets the Proposed Order’s rationale of promoting and maintaining “robust riparian stands” as being linked to riparian processes and functions that are largely accomplished by large wood recruitment “from within 30 m (~100 feet) of channel banks in managed coastal California forests.” Lastly, CAL FIRE recommends waiting until the Railroad Gulch BMP effectiveness study is completed before moving forward with considering increased protection measures.

In addition, HRC comments: “HRC can pragmatically support additional specified canopy retention requirements of a reasonable nature ($\geq 60\%$) within the current WDR proposed expanded riparian buffer widths for Class II and III watercourses in properly delineated WDR 'high-risk' sub-watersheds...” HRC goes on to say: “HRC forestry and science staff cannot however, based on available evidence, support any additional riparian requirements - see WDR Specific Requirement (I) (B) - outside of accurately delineated high-risk sub-watersheds, unless local site conditions warrant, as determined during the development and multi-agency review of individual timber harvest plans (THPs).” Finally, HRC provides excerpts from various THP review team agency reports and characterizes these reports as not supporting some of the proposed water quality protections, particularly the recommended riparian requirements for the Bridge Too Far THP.

Response – Regional Water Board staff are pleased to hear that HRC supports the proposed riparian requirements for the high risk sub-watersheds; on that component of the Proposed Order we seem to be in agreement. Regional Water Board staff also acknowledges that there is no definitive science linking a precise riparian buffer condition (width and canopy retention) to a specific response water quality condition.

However, it is widely accepted that riparian buffers are one of the primary management measures for achieving water quality protection from the impacts of timber harvesting. An extensive body of scientific literature exists describing the ecological functions of riparian zones, including those directly related to sediment and associated impacts to the beneficial uses of water. A thorough review with citations of relevant literature is presented in The Scientific Literature Review of Forest Management Effects on Riparian Functions for Anadromous Salmonids prepared by Sound Watershed Consulting for the California Board of Forestry in 2008 in preparation for revisions to Forest Practice Rules for protection of anadromous salmonids (Liquori, et al, 2008). While there is a strong conceptual understanding of the interaction between riparian zones and hillslope sediment and hydrologic processes and the effect that management activities can have on them, the scientific literature can provide no definitive guidelines establishing specific buffer widths or minimum tree retention.

In August 2002, the Regional Water Board convened an Independent Scientific Review Panel (ISRP Panel). Its objective was to strengthen the scientific basis for its decision making for protecting and restoring the sediment-impaired beneficial uses of waters in the Elk River and Freshwater, Bear, Jordan, and Stitz Creek watersheds in Humboldt County. The Panel issued two reports, which included several findings that were used as the basis to establish specific requirements of the existing watershed-wide permits. Among the findings and recommendations for the five watersheds was the recognition that most sediment enters the fluvial system from headwater streams, and therefore, within the framework of water quality protection, the largest buffers should be on Class II and Class III watercourses. The Panel also found that the 10 foot no-harvest band on Class III watercourses is likely to be of no value for the purposes of water quality protection. In referencing the ISRP Panel reports, Regional Water Board staff fully acknowledges that HRC's current management practices and those proposed in their report of waste discharge are strikingly different than those that the Panel was reviewing. Nonetheless, the Panel's findings and recommendations were specific to the Elk River and still have bearing on the proposed riparian requirements.

As documented in the Technical Report and other supporting materials, the most significant anthropogenic sediment sources in the Upper Elk River are from in-channel sources, such as headward channel incision, bank erosion, and streamside landslides. These in-channel sediment sources are perhaps most sensitive to increased peak flows which can be changed due to changes in canopy cover. The Elk River Technical Report found the majority of management related sediment production to be associated with low order channel incision and management related bank erosion and streamside landslides. The proposed riparian requirements are aimed at: 1) minimizing headward incision in low order channels; 2) reducing peakflow increases due to canopy removal in Class II / III watercourse catchment areas; and 3) controlling bank erosion and unstable channels.

Further, in contemplating the additional riparian requirements in the Proposed Order it is appropriate to consider the significantly impaired condition of the Elk River watershed and the indisputable nuisance conditions in the impacted reach. CAL FIRE and HRC contend that there is no field evidence to support the additional proposed

riparian requirements. Regional Water Board staff does not agree. The additional riparian requirements are proposed due to the unique geology of the Upper Elk River watershed, not just in the high risk subwatersheds, and the significantly impaired status of the watershed, including impacts to low order streams from past logging. These watershed specific conditions are well documented in the Technical Report which is based on extensive field observations (including HRC's data), monitoring and assessment. The evidence in the record is substantial, including evidence that the channel continues to aggrade in the impacted reach. It is these watershed-specific conditions that warrant the proposed watershed-specific riparian protection measures.

Finally, it should be noted that in issuing waste discharge requirements, the Regional Water Board must implement the Basin Plan, considering the beneficial uses to be protected and the water quality objectives reasonably required for that purpose. In addition, the Board must consider the need to prevent nuisance and need not authorize the utilization of the full waste assimilation capacities of the receiving water. The State Water Board has directed that Regional Water Boards to take preventative action to regulate the waters in the State from degradation. (See State Water Board Order No. 1982-02. (*Marina County Water District*). Further, the State Water Board has stated that "where a statute is precautionary in nature, and where evidence is difficult to come by, uncertain, or even conflicting because it is on the frontiers of scientific knowledge, a rigorous step-by-step proof of cause and effect is not required. Beneficial uses must be protected, including downstream beneficial uses." (State Water Board Order No. 2012-0013 (*Sacramento Regional Wastewater Treatment Plant*). Therefore, the proposed riparian protection measures are intended to be precautionary in nature, preventative actions necessary to protect downstream beneficial uses.

With the above background responses in mind, we turn to specific responses to CAL FIRE's comments. Regional Water Board staff believes the commenter's reference to the work by Buffleben is incomplete. The discussion during Buffleben's presentation to the Board of Forestry Monitoring Study Group in March 2010 (Buffleben, 2010) apparently led to recommendations that did not include increased riparian buffer protection, but text from his dissertation (Buffleben, 2009) says otherwise:

"Gully erosion can be minimized through a variety of actions: dewatering and diverting flow, *establishing vegetation*, or installing grade control. A combination of these erosion control measures may be necessary to reduce sediment discharges from small channels." (Buffleben 2009, pg 142, emphasis added)

Widened riparian buffer zones meet the action of establishing vegetation to minimize gully erosion. Reid et al (2010) specifically addresses gully erosion and seemingly disagrees with the CAL FIRE quote of Buffleben above; however, Reid et al brackets this conclusion of the relative ineffectiveness of riparian buffers by explaining that such "plans to maintain a prescribed distance between ground-disturbing activities and stream channels are defeated if channel networks expand into the disturbed sites after logging." Taking Buffleben and Reid et al together, a feedback loop arises where logging induces changes to channel networks, however minor, and these changes lead to

riparian buffers becoming less and less effective over multiple logging cycles. Thus, contrary to the notion that increased riparian buffer zones afford no additional benefit, increased buffers and canopy retention would mitigate the negative rate of change in buffer effectiveness induced by channel network changes due to logging or natural recovery processes of degraded low order streams. While HRC's management practices certainly has resulted in improved operations and reduced water quality-related impacts, logging activities in riparian zones in the UER are expected to have an impact on sediment delivery.

Moreover, peak flows affect not only gully erosion but also bank erosion and streamside landslides, a much larger component of the sediment source analysis reported in the Technical Report. This larger sediment source category is related to slope stability, for which CAL FIRE contends is adequately addressed through HRC's selection silviculture and a robust THP review process. While the THP review process does provide an opportunity to identify areas with acute risks of landsliding, the cumulative effects from management activities on more stable areas may increase downstream peak flows such that unstable areas may be affected. As such, the proposed riparian requirements would provide a margin of safety that adds to water quality protections afforded by the THP review process and HRC's good management practices.

Lastly, the language of "robust riparian stands" extends to more than individual riparian processes promoted by large wood recruitment, but also to a holistic view of the riparian zone where multiple processes interact to prevent impacts to water quality. Increased riparian zones and canopy retention increase canopy interception, maintain root strength, and reduce soil exposure over a larger area; the combined benefits mitigate the altered hydrology that occurs with logging. Because the Upper Elk is recognized as a highly sensitive and significantly impaired watershed, the benefits of an increased riparian zone and canopy retention with improved timber management will be additive. That is, while they each are difficult to estimate precisely, conceptually they complement each other and are necessary to improve conditions over time. Considering all the evidence in the record and applying its best professional judgment, the Regional Water Board staff has determined that additional riparian protection measures are necessary and appropriate to protect beneficial uses and meet water quality objectives of Elk River.

Regarding CAL FIRE's recommendation to wait until the Railroad Gulch BMP effectiveness study is completed before moving forward with additional riparian protection measures, impacts from logging linger 10-15 years into the future and monitoring for the Railroad Gulch study may require that time-frame to yield meaningful results. Such a long delay would constitute a failure of the Regional Water Board to address current impairments in a timely manner.

In summary, the proposed additional riparian protection measures are intended to be precautionary in nature, preventative actions necessary to protect downstream beneficial uses.

- 3. Comment** - HRC cites a presentation given by Dr. Lee MacDonald at the 2016 Redwood Symposium, which suggests that HRC's contemporary forestry-related sediment delivery is less significant relative to background and downstream sediment.

Response - Natural background loading as presented by Dr. MacDonald is largely based on estimates of cosmogenic beryllium-10 (^{10}Be) isotopes, which are then equated to denudation rates to derive long-term erosion rates. Using ^{10}Be concentrations to estimate long-term erosion rates requires a number of assumptions that may not be applicable to Elk River, where the landscape-forming processes are landslides and earthflows, which are often meters deep. Among the assumptions that the ^{10}Be method requires include: (1) all surfaces in the watershed contributed sediment to the sample in equal proportion to their long-term erosion rates; (2) that the only erosional processes in the watershed is surface erosion; and (3) that quartz is evenly distributed throughout the basin. These and other critical assumptions may not hold in mountainous watersheds with high spatial variability and substantial changes to the landscape since European settlement given watershed scale management activities. The paper cited by CAL FIRE regarding gully erosion confirms such doubts:

“Interest is growing in the use of indirect methods for inferring long-term erosion rates to allow comparison to management-related sediment inputs. Several studies have evaluated concentrations of cosmogenic ^{10}Be in soils and sediment to estimate long-term input rates (e.g., Kirchner et al., 2001). In the case of Caspar Creek, Ferrier et al. (2005) used results of such a study to conclude that recent erosion rates evaluated from monitoring data at Caspar Creek are lower than rates characteristic of the pre-logging period. Such conclusions rest heavily on the assumption that the distribution of sediment sources that produced the sampled sediment is typical of the distribution present over the period for which long-term rates are to be inferred. However, examination of the Caspar Creek tributaries indicates that gullying is now pervasive, that it probably initiated with or was greatly accelerated by first-cycle logging, and that many of the gullies excavate cosmogenically “pristine” sediment sources such as buried saprolite and bedrock. Under these conditions, samples obtained from in-channel sediments will contain lower ^{10}Be concentrations than would be expected from sediment exported before gully initiation, and estimated “long-term” erosion rates may instead disproportionately reflect accelerated erosion resulting from first-cycle logging. (Reid et al., 2010)”

Even if these assumptions were to be met in a statistically supported manner (e.g. a thorough sampling procedure for the entire watershed), the second step of equating denudation with uplift is questionable because: (1) spatial distribution of uplift rates may not be regular; (2) mountains do not necessarily form and erode at the same rate simultaneously; (3) long-term denudation rates cannot be equated with background erosion rates today without considering climatic conditions over the same time scale (Jack Lewis, pers. comm.).

Dr. MacDonald's presentation states that the drainage density used to estimate bank erosion and streamside landslides in the sediment source analysis for the TMDL are mostly "natural since individual features cannot be directly linked to management activities." Just because individual features cannot be directly linked to management activities does not mean they are, by default, natural. Bank erosion and streamside landslides are affected by pore water pressures, which are elevated by harvest and by soil cohesion which declines as roots die back after harvesting. In an unharvested Watercourse and Lake Protection Zone (WLPZ), root dieback may be unimportant, but the hydrology is still affected by harvesting upslope, supporting increased riparian protections.

RWB staff recognizes the need to address these and many other issues through a science based adaptive management process. To that end, the RWB has provided funding to support the independent Recovery Assessment, Elk River Watershed Stewardship Program, and Elk River Sediment Remediation Pilot Implementation Projects. The RWB believes that these are the most appropriate forums to address technical uncertainties that will be considered as it adjusts its regulatory programs and restoration options.

4. **Comment** – HRC comments that the triggering amount of rainfall that suspends hauling operations should be significantly greater than the proposed 0.25 inches over a 72 hour period. Instead, HRC suggests that a triggering threshold be greater than one inch in a 24-hour period during the extended wet weather period October 15- May 1.

Response: Wet weather requirements from the April 7, 2016 proposed Order required a complete cessation of timber operations following 4 inches of precipitation after October 1. In response to comments by Board members and other commenters that the wet weather requirements lacked flexibility for operations during extended dry periods when certain operations could be conducted with a low risk of sediment discharge, RWB staff has proposed a newly defined, "dry weather conditions". Dry weather conditions are defined as less than a cumulative total of 0.25 inches of precipitation during any consecutive 72 hour period as measured at NWS Woodley Island. The proposed rainfall amount is based on rainfall at the National Weather Service Woodley Island gauge station, which is outside of the Elk River watershed. As storm systems move into the Humboldt Bay area and encounter higher elevations, the system's ascent and encountering of low pressure environments may result in precipitation greater than that observed at the Woodley Island Station. Thus, the proposed triggering rainfall amount is a conservative estimate to ensure a margin of safety to account for spatial variation in rainfall, a variation that skews towards greater quantities at higher elevations. Visually, a map of annual rainfall from Oregon State University's PRISM1 (Parameter-elevation Relationships on Independent Slopes Model) shows that 30-year normals (average annual precipitation over the most recent three full decades) at Woodley Island is lower than that of the Upper Elk (Figure 1).

1 <http://www.prism.oregonstate.edu/>

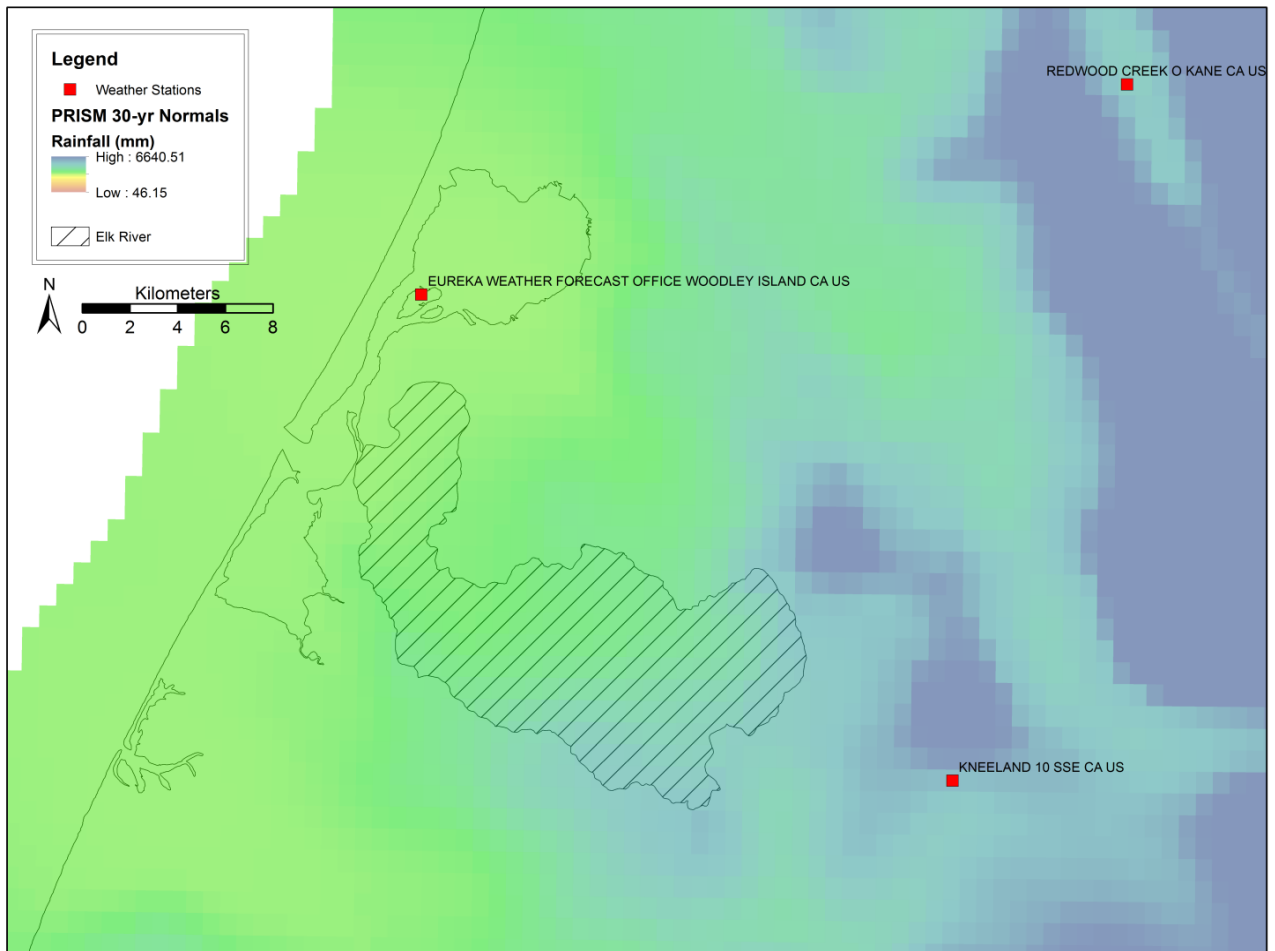


Figure 1: PRISM 30-year Normals (average annual precipitation over the most recent three full decades)

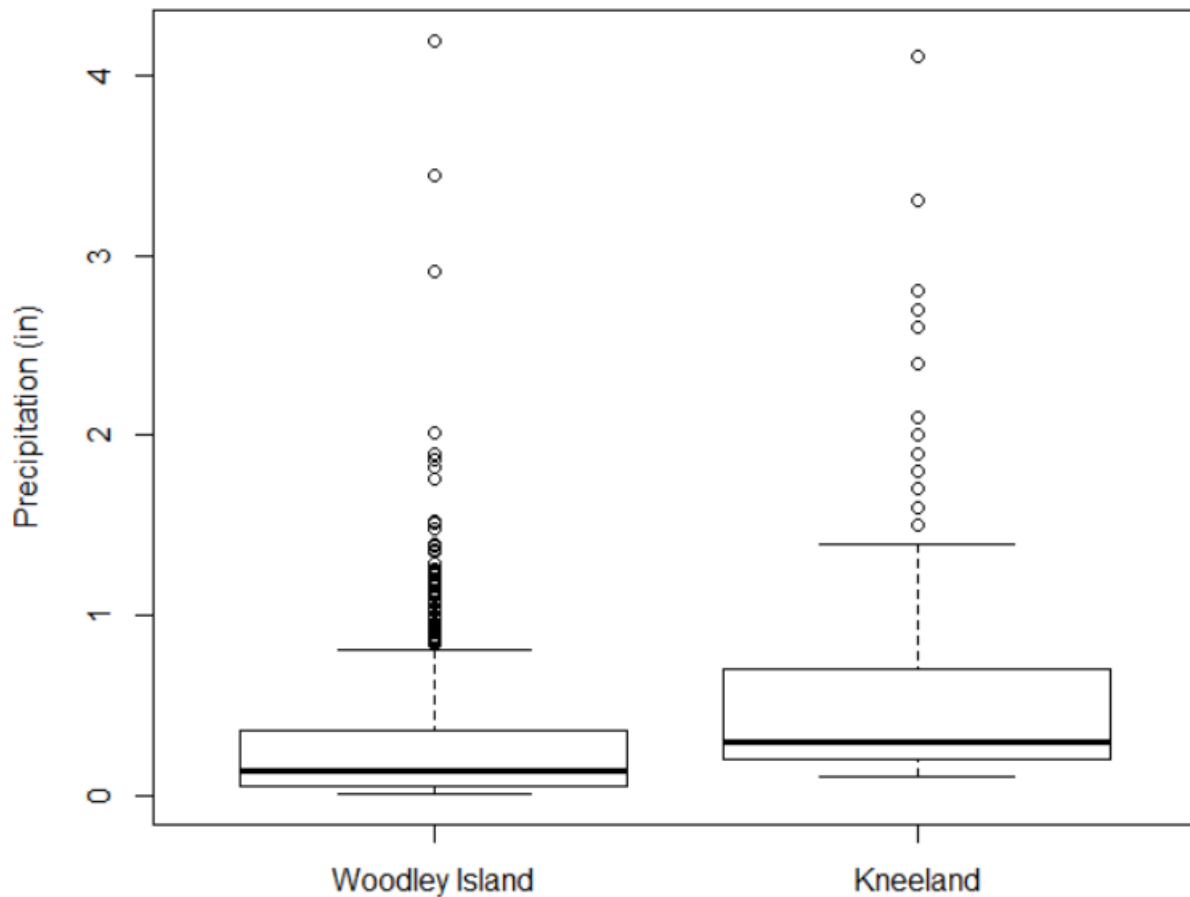


Figure 2: Nonzero daily precipitation box-and-whisker plots at Woodley Island and Kneeland with $1.5 \times$ interquartile range being the definition of “outliers” or values outside the whiskers. Time period spanned 1996 through 2013 for the months of October to May.

Quantitatively using the Wilcoxon² test at significance level $\alpha=0.05$, a weather station close (approximately 4.5 miles to the closest Upper Elk boundary) to the Upper Elk at Kneeland shows a statistically significant higher non-zero daily rainfall (Figure 2) for the months October to May during the years 1996 through 2013. Including only days with rainfall totals 0.25 inches or greater, the median difference between Woodley Island and Kneeland were 0.25 inches. That is, if Woodley Island receives 0.25 inches in *24 hours*, then Kneeland could receive 0.50 inches, or double the rainfall amount. If the Proposed Order were modified according to HRC’s recommendation of 1 inch over 24 hours at Woodley Island, then the Upper Elk could receive up to 2 inches. Another Wilcoxon test for the difference of daily totals greater than 0.25 inches between the two stations is also statistically significant—i.e. the median difference between the subset data is greater than zero. Data were obtained from the National Oceanic and Atmospheric Administration’s Climate Data Online database. The daily values were

² Wilcoxon one-sample and two-sample tests of significance do not require normally distributed data. Precipitation data are not normally distributed when tested using the Anderson-Darling and Lilliefors tests for normality (p -value <0.05). When paired data are used, statistical significantly difference between the medians are tested.

derived from hourly rainfall, because the hourly Kneeland data had the greatest coverage and the hourly datasets explicitly excluded hours with zero rainfall.

In essence, the above discussion shows that the triggering event as measured at Woodley Island would be significantly higher in the Elk River watershed. Similarly, HRC's proposed triggering event of 1 inch in 24 hours as measured at Woodley Island would assuredly be a much higher rainfall event in the Elk River watershed and would not prevent or minimize sediment discharges in this severely impacted watershed.

5. Comment – HRC recognizes the need for wet weather restrictions but opposes the specific aspects of the Wet Weather Requirements included in the Proposed Order and suggested alternative requirements, which are itemized below:

- a. HRC can support the proposed additional WDR requirements *if it specifies its application is limited to hauling operations on native, non-rocked roads*"

Response –HRC's Habitat Conservation Plan (HCP) recognizes the need for a seasonal cessation of hauling on non-rocked roads once a seasonal soil moisture threshold has been reached. HCP section 6.3.3.6 specifies, "on roads that do not meet the permanent standard, once hauling operations have ceased during the wet weather period due to Item 1, above [cessation of hauling when precipitation is sufficient to generate overland flow off the road surface in hydrologically connected road segments], they shall not resume until June 1 or the road meets the permanent standard." RWB staff recognize that HRC has invested considerable resources towards upgrading many of its mainline haul roads throughout Elk River to permanent standards. However, logging roads are typically surfaced with a mixture of fine (silt, sand and clay) and coarse (gravel or larger) materials. The fine particles bind the coarse fraction in place to form the durable surface designed to withstand and distribute forces exerted from heavy loads such as logging trucks. Repeated trips by log trucks, particularly when materials are saturated and lose strength, can result in a constant "pumping" of fines to the surface, which can easily be mobilized by runoff during storms. Rocked logging roads are not 100% effective in preventing the generation and mobilization of fine grained materials. Due to the high average annual rainfall in Elk River, once having reached saturation, soils may remain wet throughout much of the winter period, and quickly reach saturation after small storm events. The requirement that hauling may not take place until dry weather conditions exist is intended to minimize log hauling when road surface strength is diminished and susceptible to fine sediment production.

- b. "HRC can support a triggering threshold of *greater than one inch in a 24 hour period during the extended wet weather period October 15-May 1, specific to all road surfaces, requiring cessation of hauling for a maximum of 48 hours.* We ask the RWB to consider the existing requirements for road use found in the Forest Practice Rules and the HRC HCP"

Response –RWB staff find the threshold proposed by HRC of *one inch in a 24 hour period during the extended wet weather period October 15-May 1, specific to all road surfaces, requiring cessation of hauling for a maximum of 48 hours* would not be

protective of water quality. As discussed in the response to comments 4, above, one inch of rain at the Woodley Island station could equate to 2 inches in portions of the Elk River watershed. As has been demonstrated by photographs entered into the record during the public hearing on April 7, 2016, even early in the season, significant runoff can result from a 2 inch precipitation event. As discussed above, in order to minimize log hauling when road surface strength is diminished and susceptible to fine sediment production, roads should be given an adequate period to dry prior to resumption of hauling following a significant rainfall event.

- c. "HRC recognizes there is a period in a typical Humboldt County winter when soils become saturated such that ground-based yarding operations can and should be reasonably suspended as an extra caution (i.e. margin of safety) until the ensuing spring. However, a complete prohibition of ground-based yarding from October 1 to May 1, *independent of soil conditions, provides little nexus with protecting water quality*, considering existing equipment exclusion zones protecting riparian areas and other limitations on ground based yarding operations in effect.

HRC can support a shut-down of ground based yarding operations *following ten inches of cumulative rainfall, not to resume until May 1st at the earliest, provided this restriction is limited to ground based logging operations within 200 feet of a watercourse.*"

Response – Of all timber operations routinely practiced in North Coast watersheds, ground based operations, which entail use of tracked heavy equipment and skidding logs, is recognized as resulting in the most significant ground disturbance and the highest potential for sediment discharge. Skid trails are typically not rocked and are therefore, much less resistant to soil disturbance from tracked equipment than permanent rocked roads, particularly when wet. High average annual precipitation in the Elk River watershed results in soils being wet or saturated throughout the majority of the winter period. Because of the high potential for sediment discharge resulting from ground based operations during the winter period, RWB staff maintain that the restriction on ground based operations during the winter period following 4 inches of rain after October 1 is necessary and reasonable to prevent sediment discharge.

6. **Comment** – HRC requests that in order to align WDR requirements with HRC's current operations and reduce complexity and confusion, the Wet Weather Requirements use the existing Forest Practice Rules definition for "Winter Period", November 15 – April 1 and "Extended Wet Weather Period", October 15 – May 1.

Response – The intent of the proposed Wet Weather Requirements is to establish a clearly-defined, protective, and transparent standard. RWB staff propose using the National Weather Service station at Woodley Island in Humboldt Bay because it typically experiences the same storm systems as the Elk River watershed and daily rainfall data is readily available online at: <http://cdec.water.ca.gov/cgi-progs/queryDaily?ERK>. Long term precipitation records indicate that seasonal rainfall typically begins increasing in October (average rainfall in October is 2.99 inches). The proposed Wet Weather Requirements were designed so that seasonal restrictions

would commence once a precipitation threshold, based on the hydrologic year for the site, which is October 1 to September 30, has been reached. RWB staff believe that basing seasonal restrictions on a precipitation threshold, rather than a fixed date, provides a better linkage to actual conditions on the ground. In addition, rather than being complex or confusing, because the rainfall data is readily available online for all to see, HRC, regulatory agencies, and other interested parties can easily keep track of when seasonal thresholds have been met and when the conditions for extended dry periods have been met.

7. **Comment** – HRC asks that the Wet Weather Requirements limiting all timber operations in the high risk subwatersheds after 4 inches of rain has fallen after October 1 exclude timber falling, as this activity poses a low risk of sediment delivery.

Response – RWB staff agree. Finding 58 and section A.E.4 of the proposed Order has been revised accordingly.

8. **Comment** – Kristi Wrigley and Vivian Helliwell state that no winter operations should be allowed between October 15 and May 15 (Kristi) or October 15 and April 1 following 3 inches of accumulated rain (Vivian).

Response – Please see Responses 4-7 above discussing limits on wet weather operations.

9. **Comment** – HRC is concerned that the Board’s regulatory decisions are taking place outside of the regulatory process or without the substantial weight of evidence, with no explanation for that perceived deviation. HRC cites recent THPs, including the “Bridge Too Far” THP, which the Executive Officer of the Regional Water Board has either declined enrollment or provided recommendations. HRC disagrees with these RWB determinations and comments that the prescriptions of the Proposed Order are being applied to these recent THPs.

Response – First, it is important to recognize that the determination associated with the Bridge Too Farm THP, though related, is beyond the scope of the hearing on November 30th. The Regional Water Board staff has taken actions consistent with the provisions in the Forest Practice Rules and Public Resources Code in determining whether THPs contain adequate measures to comply with the Regional Water Board Basin Plan. The guidelines for the THP approval and review process are guided by the Forest Practice Rules. As provided for in the Forest Practice Rules and Public Resources Code, Regional Water Board staff participates in the THP review process and makes recommendations for conditions that should be included in a THP prior to its approval to ensure the Plan will meet water quality objectives and comply with the Basin Plan. As stated by the California Supreme Court, “The THP Process is designed to give the Department of Forestry, the benefit of the Regional Water Quality Control Boards’ expertise through nonadversarial consultation.” (*Pacific Lumber Co. v. State Water Resources Control Board* (2006) 37 Cal. 4th 921, 945.) The recommended measures that staff has proposed for inclusion in the “Bridge Too Far” THP are consistent with staff recommendations in the Proposed Order. In approving a THP, CALFIRE is required to

consider whether the THP will comply with Regional Water Board requirements, and disapprove any THP where implementation would cause a violation of any requirement of a Regional Water Board Basin Plan. (Forest Practice Rules § 898.2 (h).) Likewise, in issuing WDRs the Regional Water Board must consider whether the requirements will be in conformance with the Basin Plan (Water Code § 13263.) It is appropriate to consider whether a THP will comply with water quality requirements during both the THP review process, and during proceedings where the Regional Water Board is issuing WDRs. (Public Resource Code § 4514 (c).) Decisions made in both the THP review process and in the development of Waste Discharge Requirements are based on evaluations of the water quality impacts of the proposed activity. In this case, those recommendations were made while the Board's consideration of a Waste Discharge Requirement permit is pending and are informed by the condition of an already impaired waterbody. At the conclusion of the hearing on the Proposed Order, the Regional Water Board will ultimately decide on appropriate waste discharge requirement conditions and those conditions will be consistently applied in determining whether a particular THP complies with the Basin Plan and in determining associated enrollment of the THP. If necessary following Regional Water Board adoption of the subject Order, the current Bridge Too Far THP recommendations and determination will be revised by Regional Water Board staff in accordance with the RWB-adopted order.

10. Comment - Jerry Martien, Friends of Elk Creek, questions the justification, and is opposed to, changing the 2% equivalent clearcut acres averaged over any 10 year period in any subwatershed from a fixed harvest limit to a threshold of concern.

Response – Findings 32 through 39 of the Proposed Order provide a discussion of harvest rates and the RWB's rationale and approach to addressing potential impacts from the rate of canopy removal and associated operations that result in ground disturbance. The Proposed Order relies on a suite of management practices designed to prevent water quality impacts at varying spatial and temporal scales. Among the key components of the proposed framework for water quality protection established by the Proposed Order are harvest limits for HRC's entire ownership within Elk River, for individual subwatersheds (sections I.A.1-3 of the Proposed Order), and within RMZs (see conifer canopy coverage requirements in section I.B.2-4 of the Proposed Order).

Cumulative impacts resulting from high harvest rates have been recognized and studied in the North Coast region for many decades. In the past, high rates of harvesting have combined with destructive logging practices to cause profound adverse watershed impacts. These impacts are still present throughout most forested watersheds in the North Coast, as is reflected in the prevalence of waterbodies listed as impaired by excess sediment under Clean Water Act section 303(d). The observed direct relationship between harvest rate and magnitude of sediment impacts is primarily due to two factors; ground disturbance from harvesting (i.e. road and skid trail construction and use, dragging logs) and hydrologic effects from canopy removal, roads intercepting and concentrating runoff and shallow groundwater, and changes in runoff volume and patterns from altered ground cover.

Ground disturbance can cause sediment discharge from increased surface and gully erosion, mass wasting, watercourse crossing failures, and channel destabilization. If such activities generate sediment above background rates, as the activities are applied across larger proportions of a watershed in a given time period, sediment production will increase proportionally. Sediment discharge from these sources can be significantly reduced, but are not expected to be completely eliminated by implementation of proper management practices such as those required under the FPRs or HRC's HCP. As harvesting practices improve, ground disturbance effects that are due solely to harvest rates are expected to become less of a factor contributing to cumulative watershed effects, however the ground disturbance effect due to harvest activities may not be reduced to insignificant.

In addition, tree removal can reduce interception, evaporation, and evapotranspiration of rainfall by forest canopy, increase the volume of precipitation that infiltrates and remains in soils, increase pore pressure, and alter stream hydrographs by increasing the magnitude and intensity of peak flows in watercourses. Increased pore pressures can increase the likelihood and magnitude of slope failures. Changes in hydrographs can result in channel scour and increases in bank failures. Tree roots enhance the strength of shallow soils, increasing the soil's ability to resist failure. When trees are harvested their roots gradually decay, reducing the soil reinforcement the roots provide and increasing the potential for shallow landslides. Harvesting trees can result in increased soil moisture and runoff and decreased root strength, which can contribute to landsliding and increased erosion throughout a watershed. Hydrologic effects from canopy removal can only be reduced or prevented by limiting canopy removal through silvicultural prescriptions and harvest rate limits.

While it is recognized that limiting harvest rate is a critical factor in controlling cumulative watershed effects and various studies have attempted to develop methods to determine thresholds for the rate of harvest, there is no scientific agreement on a specific method or harvest rate limit. Watershed impacts from harvesting have been linked to processes such as increased peak flows from road density and canopy removal (Lisle et al. 2000, Lewis et al. 2001), landslide related sediment discharge (Reid, 1998) and road density (Cedarholm et al. 1981, Gucinski et al. 2001, Trombulak et a, 2000). Klein et. al (2012) analyzed turbidity data from 28 North Coast watersheds for water year 2004-2005 and found elevated chronic turbidity levels in those watersheds in which the harvest rate exceeded 1.5% equivalent clearcut acres. In an attempt to address concerns over cumulative watershed effects from harvest rates, the U.S. Forest Service developed the equivalent clearcut area method (USDA Forest Service, 1974) to account for the relative impacts of different types of silvicultural treatment. It assigns a weighting factor of one to clearcutting and a value less than one for partial harvesting silvicultural treatments. The weighting factor for a silvicultural treatment is multiplied by total area treated under each silviculture to arrive at a normalized disturbance calculation. Therefore, 100 acres of selection harvest, which is typically assigned an equivalent clearcut acres factor of 0.5, would be counted as 50 equivalent clearcut acres. The Forest Service utilizes thresholds of concern (TOC) approach to guide management decisions. The TOC is based on the watershed's sensitivity. When harvest

rates approach the TOC, additional assessment of impacts or modifications to management are implemented.

HRC's report of waste discharge describes its Forest Management Plan, including projected timber harvesting over a twenty year period between 2015 and 2034 based on multiple management factors such as growth and inventory, forest canopy, protection of critical terrestrial and aquatic habitat, and watershed analysis constraints. HRC's projected harvest are presented as average annual harvest acreage (and equivalent clearcut acres) and average overlapping crown canopy for each five year period throughout the UER as well as for individual subwatersheds. Average annual harvest rates required under the Proposed Order for its entire ownership in the Elk River watershed equate to less than 1.5% equivalent clearcut acres. These rates are lower than those required under the 2006 WWDs, which allowed annual harvest rates of 1.9% in the North Fork and 1.8% and upwards in the South Fork. The majority of subwatershed harvest rates are less than 2% equivalent clearcut acres per year averaged over any 10 year period. However, projected 10 year average harvest rates for some five-year periods in some subwatersheds exceed 2%. In order to ensure that proposed harvest rates do not contribute to ongoing cumulative impacts on water quality, the RWB staff had originally proposed a firm limit on subwatershed harvest rate of no more than 2% equivalent clearcut acres over any 10 year period. Upon further consideration, RWB staff modified the 2% subwatershed rate as a TOC, such that where an individual, or multiple, THP(s) would exceed that rate, the Executive Officer or Regional Water Board may decline to enroll the THP(s), or portions of the THP, or may condition enrollment on HRC implementing additional mitigation and monitoring requirements. In addition, as discussed in the response to comments #11 below, the Proposed Order has been revised to include a new section VI that specifies conditions warranting rescission or denial of coverage by the Executive Officer.

11. Comment – Section I.A.3 states, “Where an individual, or multiple, THP(s) would result in an average annual harvest rate in any subwatershed above 2% equivalent clearcut acres over any 10 year period, the Executive Officer may decline to enroll the THP(s), or portions of the THP, or may require additional mitigations or monitoring as a condition of enrollment.” HRC staff expresses concern that the specific requirement does not define conditions that must be present for the Executive Officer to take such action, such as increased landslides, or sediment delivery from surface or channel erosion from harvested areas.

Response – The Proposed Order has been revised to include a new section VI that specifies conditions warranting rescission or denial of coverage by the Executive Officer, which includes the following provisions (subsections 5 and 6):

“The Executive Officer shall rescind or deny coverage for a THP under these WDRs if the Executive Officer makes any of the following determinations:

5. The THP meets the Terms and Provisions of these watershed-wide WDRs, but may still result in a discharge of Waste that could adversely affect water quality from any of the following:

- a. An observable increase in sediment discharge from landslides, channel or streambank erosion, or surface or gully erosion associated with harvest activities;
 - b. A measurable and significant increase in turbidity or suspended sediment concentration as a result of harvest related activities;
6. Any operations on an individual, or multiple, THP(s) that would result in an average annual harvest rate in any subwatershed above 2% equivalent clearcut acres over any 10 year period that has resulted, or would be likely to result in any of the following:
- a. An observable increase in sediment discharge from landslides, channel or streambank erosion, or surface or gully erosion associated with harvest activities;
 - b. A measurable and significant increase in turbidity or suspended sediment concentration as a result of harvest related activities”

12. Comment – Jerry Martien and EPIC question the justification, or are opposed to, changing the prohibition on harvesting in high risk subwatersheds to limited harvesting.

Response – Similar to comment #10 above, this comment essentially addresses harvest rate. In this case, the RWB staff initially proposed zero harvesting in certain subwatersheds as a means of implementing the Basin Plan standards based on the sensitive nature of the landscape and on the Technical Report. Based on comments received and lacking a robust methodology for establishing a hard limit of zero harvesting in the most sensitive subwatersheds, RWB staff have revised the requirement from a prohibition to a limited harvest requirement. Section I.A.4.a specifies that HRC shall be limited to harvesting a single THP in the high risk subwatersheds during the first five years following adoption of the Order. Section I.A.4.b specifies that during the second five year period following adoption of the Order HRC shall also be limited to a single THP as proposed in Table 4.3 of the ROWD, unless the RWB directs staff to implement further harvest limitations at the required five year update, based on available information on watershed conditions, including progress made on recovering beneficial uses in the impacted reach. The proposed limited harvesting requirement is combined with enhanced RMZ and wet weather requirements, which limit operations to periods of dry weather conditions once there is 4 inches of accumulated precipitation in any water year (October 1 - April 30) until operations can resume on May 1.

13. Comment– Kristi Wrigley states, “The buffer zones are too small and definitely should be measured on the horizontal not slope distance. Small intermittent streams need at least 50 ft. no cut zones, smaller all year streams need 100 ft. no cut zones and Elk River itself needs 300 ft. no cut protection to even begin to enable reasonable recovery.”

Response – It is standard practice in forestry to measure buffers along slope distance. Measuring horizontal distance rather than distance along a slope would be difficult to implement in the field. In addition, riparian buffers are intended to protect streams from physical processes that mostly operate parallel to hillslope, such as mass wasting,

surface erosion, increased runoff, and large wood recruitment. The proposed increased width of riparian buffers over the standard prescriptions for Class II and III streams provide these streams a significant increased level of water quality protection (see additional discussion in response to Comment #2 regarding buffer proposed buffers widths and canopy cover).

14. Comment– Jesse Noel poses several comments and questions regarding the loss of root biomass from harvesting trees and attached a draft article by Robert Ziemer and Jack Lewis of PSW Redwood Science Lab. The commenter includes the following questions:

“Have you, or has some Geologist evaluated the effect of loss of root strength and root depth on the soils found in the 303d listed portion of Elk River pursuant to this WDR to determine whether reduction of root strength and depth constitutes a statistically significant factor for discharge or loading?”

“How will the decreased root concentrations in the soil that will result under the proposed WDR interact to create impacts to water quality that could be avoided under the community forest alternative? See attached study by Ziemer re: redwood roots, figure 3, 4, 5, etc. Looks like the WDR is going to reduce roots in the soil at depths of .66 meter to 1.33 meter by about 20%. To what extent does a 20% reduction roots at that depth reduce cohesion, increase land sliding and soil creep rates, and pipe erosion?”

Response – The draft Ziemer and Lewis paper describes a cluster sampling methodology for measuring root biomass in soil and reports findings from random samples of 2-4 clusters from 6 redwood and 7 mixed conifer stands selected to represent successional stages following logging. Previous work by Robert Ziemer and others have found that when trees are harvested, their roots gradually decay, reducing the reinforcement they provide and increasing the potential for shallow landslides. The loss of root strength gradually increases over a period of several years, with the critical period of maximum loss occurring approximately 5 to 15 years after harvesting (Ziemer 1981). Root die back following selective harvesting of stands dominated by redwood, which is a resprouting species, is significantly less than in stands dominated by non-sprouting species. Cut redwood stumps typically do not die, but some portion of their existing roots will decay as new roots grow and gradually replace the old ones. In addition, Ziemer (1992) found a nearly four-fold increase in peak flow and an increase in sediment transport through soil pipes following clearcut logging in Caspar Creek.

The commenter asks whether RWB staff have quantified reductions in root strength, and then suggests that, based on Ziemer’s work, harvesting conducted pursuant to the WDR would result in a 20% reduction in root strength. While Ziemer’s work is based on empirical observations and does not provide a method for modeling or calculating loss of root strength, some loss of root strength can be expected for the period approximately 5 to 15 years after selective harvesting of predominantly second growth redwood stands. Loss of root strength from harvesting would be most likely to result in slope failure on the most vulnerable slopes. In the most general terms, a slope will fail when the forces driving downward movement (driving forces) exceed those resisting

that movement (resisting forces). Tree roots can contribute significantly to forces resisting failure in shallow soils by anchoring soils to bedrock and bolstering shear strength. In order to minimize the potential for harvest related sediment discharge, harvesting should be avoided or minimized on vulnerable slopes. Slope gradient is one of the most important, and easily identified, factors driving failure. Other factors are present in the subsurface, and therefore less easily recognized in the field, such as variations in soil strength and hydrologic properties and preferential flow paths such as soil pipes. The standard of practice for geologic review of timber harvest plans as described in California Geological Survey Note 45³, Guidelines for Engineering Geologic Reports for Timber Harvesting Plans, typically does not include subsurface investigation. Findings 51 through 57 of the Proposed Order, describes measures that are required by the current WDRs and HRC's HCP that have successfully prevented sediment discharge from harvest related landslides since development in 2008 of a monitoring and reporting program to ensure compliance with "Tier 2" zero discharge requirements in the current WDRs.

One of the primary objectives of the Proposed Order is to establish requirements designed to reduce harvest related sediment discharge from landslides, including:

- Harvest rate limits throughout HRC's ownership in Elk River including in high risk subwatersheds;
- Use of partial harvesting methods that retain a significant component of post-harvest root strength;
- Riparian protection zones, which include no harvesting within 50 feet of Class I watercourses, 30 feet of Class II watercourses, 20 feet of Class III watercourses and specific conifer canopy cover within 150, 200, and 100 feet of Class I, II and III watercourses, respectively;
- Review by a Professional Geologist of all proposed activities, including harvesting and construction or reconstruction of roads and watercourse crossings; and
- Implementation of HRC's Elk River and Salmon Creek Watershed Analysis hillslope management prescriptions (Appendix A of HRC's ROWD, HCP section 6.3, prescriptions based on watershed analysis for Elk River and Salmon Creek).

15. Comment– Vivian Helliwell states, "No additional sediment discharge from logging should be allowed at this time".

Response: The capacity of the Upper Elk River for sediment is limited by the ongoing aggradation in the impacted reach and the resulting nuisance conditions and impaired beneficial uses. Based on technical analysis and evidence received in support of the TMDL Action Plan adopted by the RWB in May 2016, the assimilative capacity of the impacted reach for additional sediment is defined as zero until its assimilative capacity is expanded through sediment remediation and channel restoration, nuisance conditions are abated, and beneficial uses are supported. In the Upper Elk River

³ California Department of Conservation, California Geological Survey Note 45, 2013, Guidelines for Engineering Geologic Reports for Timber Harvesting Plan.

Watershed, all the land use-related sediment delivered to the stream channel is attributed to nonpoint source pollution and natural background. Due to the lack of assimilative capacity in the impacted reach, the RWB has determined that the nonpoint source load allocation should be defined as zero. When water quality is already degraded, it may take time to achieve water quality objectives and support beneficial uses, and immediate compliance may not be possible, even with complete cessation of a discharging activity. (See generally Nonpoint Source Policy at 13.) That said, WDRs must include requirements designed to show measurable progress toward improving water quality over the short term and achieving water quality objectives in a meaningful timeframe. Pursuant to Water Code section 13263, the Regional Water Board shall prescribe requirements as to the nature of any proposed or existing discharge with relation to the receiving water conditions. Requirements shall implement any relevant Basin Plan requirements and take into consideration beneficial uses of water, water quality objectives, the need to prevent nuisance, and other relevant factors. To meet water quality requirements, WDRs can prohibit the discharge of waste or certain types of waste, either under specific conditions or in specified areas. (Wat. Code, § 13243.) To ensure that requirements and conditions of discharge remain protective of water quality, Porter-Cologne requires periodic review of waste discharge requirements.

The Proposed Order implements the Basin Plan and ensures that water quality is protective of beneficial uses and addresses nuisance conditions by proposing robust BMPs, additional riparian zone and wet weather protections, and harvest rate restrictions based on stream classes and relative risk of subwatersheds. Staff consider the specific requirements established in the Proposed Order to be a reasonable and appropriate approach.

As measures in the Proposed Order are implemented, the RWB will evaluate their effectiveness to determine whether the measures are leading to improvements in the watershed and may revise the Order as necessary.

16. Comment - Vivian Helliwell states, “The water quality goal should be water clarity as that coming out of Headwaters Preserve.”

Response – The water quality goal is to meet water quality objectives and ensure protection of beneficial uses in the impaired waterway. The technical reports for the Elk TMDL Action Plan includes in-stream water quality indicators, and the following target for chronic turbidity:

“Clearing of turbidity between storms to a level sufficient for salmonid feeding and surface water pumping for domestic and agricultural water supplies”

The measures in the Proposed Order are intended to meet Basin Plan standards and the above described target for turbidity.

17. Comment – Vivian Helliwell states “HRC should perform the feasibility study”.

Response - Section I.G. of the Proposed Order requires that HRC conduct a feasibility study to evaluate potential projects or methods to control, trap, or meter sediment from in-channel sources in the UER before it can be transported to the impacted reach. The feasibility study should identify potential projects or methods to reduce transport of sediment from tributaries in the UER to the impacted reach that may include design and implementation of small scale pilot projects. If the pilot projects demonstrate the success of methods, HRC shall develop a detailed workplan by October 15, 2020 and implement these methods on a wider scale throughout the watershed.

18. Comment – Vivian Helliwell states “Cumulative effects are compounding, not additive, and the WDR must allow for big storms and earthquakes.”

Response - Cumulative Watershed Effects (CWEs) are defined as significant, adverse influences on water quality and biological resources that arise from the way watersheds function, and particularly from the ways that disturbances within a watershed can be transmitted and magnified within channels and riparian habitats downstream of disturbed areas (Dunne, et al, 2001).

The Action Plan for the Upper Elk River Sediment TMDL and the large body of technical analysis produced by RWB staff and other workers since the watershed was determined to be cumulatively impacted in 1998 has been aimed at addressing those impacts. CWE's are difficult to quantify, but that they are profound in the Elk River watershed is incontrovertible. The majority of the proposed requirements are designed to result in conditions on HRC's managed timberlands that are sufficiently resilient as to protect water quality from the impacts of large stochastic events, such as large storms or seismic events.

19. Comment – Vivian Helliwell states “CDF and responsible agencies that permitted degradation should help pay for accelerated remediation.”

Response – Comment noted. The Proposed Order requires HRC to identify and treat all controllable sediment sources on their ownership and implement stringent controls to minimize creation of new sediment sources to the extent feasible. In addition, HRC is also partnering with the Regional Water Board, NGOs, and other agencies to address chronic downstream health and safety concerns relative to water quality, domestic water supply, and winter storm flooding. HRC's participation includes voluntary financial and in-kind contributions to the Elk River Watershed Stewardship process, whose goal is to convene a participatory program that engages community members, residents, scientists, land managers, and regulatory agencies in developing a collaborative planning process that seeks to enhance conditions in the Elk River watershed. The Watershed Stewardship Program has already secured over \$800,000 in public funding and will work to accomplish the following goals:

- Promote shared understanding and seek agreements among diverse participants; and
- Identify strategies and solutions to:
 - Improve the hydrologic, water quality, and habitat functions of Elk River;
 - Reduce nuisance flooding and improve transportation routes during high water conditions;
 - Improve residential and agricultural water supplies; and
 - Promote coordinated monitoring and adaptive management.

20. Comment – Vivian Helliwell states, “The WDR needs to identify the factors that promote or limit salmon production over time. Your conclusions are not supported by the statement of facts in this Draft WDR. This WDR violates the ESA, CESA, the Basin Plan, the Non---source Point Policy, ignores the Coho Recovery Strategy and the state legislature’s intent to double salmon populations. Please strengthen this WDR in the ways recommended and put us on a faster track to recover the beneficial uses.”

Response – It is not clear which conclusions the commenter refers to that are not supported by statements of facts in the Proposed Order. The long term goal of the Proposed Order and associated RWB actions in the watershed as described in the TMDL Action Plan is recovery of all existing or potential beneficial uses of water in Elk River. The Proposed Order establishes requirements intended to implement the Basin Plan, including support, or restore where impaired, beneficial uses of water, including those associated with anadromous salmonids:

Rare, Threatened, or Endangered Species (RARE) - Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

Migration of Aquatic Organisms (MIGR) - Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN) - Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Water quality indicators included in the Technical Report describe a condition under which water quality and hydrogeomorphic features in the Upper Elk River stream network are able to meet the following three instream goals:

1. Support salmonids throughout their historical range;
2. Support the use of surface water for domestic drinking water and agricultural water supplies, particularly within the impacted reach; and
3. Contain historic bankfull discharges within the bankfull channel, particularly within the impacted reach.

Factors limiting populations of anadromous salmonids in Elk River and other Humboldt Bay tributaries are fully described in the documents such as Recovery Strategy for California Coho Salmon (CDFW, 2004) and Final Recovery Plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (NOAA NMFS, 2014). It is not necessary to restate this information in the Proposed Order.

The Recovery Strategy for California Coho Salmon includes watershed specific recommendations to promote recovery of Coho Salmon, including the following that are most pertinent to impairments in Elk River:

- Assess sources of sediment input, prioritize and implement remediation projects;
- Review recent habitat surveys and identify gaps in data; conduct habitat surveys in areas identified as lacking data;
- Identify and prioritize rearing habitat reaches for protection;
- Improve quality and quantity of deep pools and spawning gravels;
- Maintain, protect and restore channel conditions important to all life stages of coho salmon (e.g., spawning gravels, pool depth, rearing gravels, food) as it relates to bed load;
- Identify reaches where naturally functioning channel and flood plain conditions exist;
- Maintain and restore a functioning flood plain and natural channel processes where practicable;
- Maintain open space lands (e.g., agriculture, forestland) for water retention and limit addition of impervious surfaces in the watershed;
- Identify impacted reaches where a functioning flood plain could be re-established;
- Establish access for both adult and juvenile coho salmon to suitable habitat where practicable;
- Conduct LWD survey, identify location and areas for potential recruitment and/or placement of LWD structures;
- Ensure that there are adequate incentives for landowners who choose to protect and/or restore watershed processes;
- Maintain functional riparian habitat. Conduct assessment of historic and present riparian conditions;
- Develop site specific riparian restoration plans;
- Maintain and/or attain turbidity and suspended sediment levels beneficial to coho salmon during all life stages;
- Establish a coordinated turbidity monitoring plan; and
- Reduce input of fine sediments into the stream system by the following actions.

Many of the recommendations described above are required under the Proposed Order. In addition, many of these actions have been, or are currently being implemented in the Elk River through a widespread range of actions by multiple landowners, agencies, and other stakeholder groups, such as the Watershed Steward Program.

21. Comment – Jerry Martien states that at the May 12, 2016 public hearing, “the Board removed or compromised every protection we had proposed for the river, and even came up with some new ways around their mandate to protect water quality:

- “Adding ‘as appropriate and when feasible’ to the crucial requirement of a disconnect between roads and water courses.”

Response – There was no change to the referenced wording in the draft Order. The April 7, 2016 version included the words, “to the extent feasible.”

- “The revision of Finding 7 [Finding 9], removing any hint of responsibility for Upper Elk River’s 640,000 cubic yards of sediment. Now we’re told they were not “produced by management activities,” but “accumulated in the past two decades.”

Response – This volume of sediment was erroneously described in the April 7, 2016 proposed Order as being produced by management activities. The Technical Report simply refers to this volume as an estimate of the volume deposited in the impacted reach over the past three decades. Finding 9 has been corrected.

- “further exempting the Railroad Gulch BMP Study from this moratorium. (We know that logging degrades water quality, that this sub-watershed has experienced serious debris flows during past winters, and that the river has zero assimilative capacity for sediment—but let’s log anyway and call it science.)”

Response – Unit 2 of the McCloud Shaw THP has been included in a paired watershed study (the Railroad Gulch BMP Study) to evaluate the impacts of harvesting under HRC’s HCP and watershed analysis based prescriptions on sediment production. The study, which is a collaboration between HRC, CAL FIRE, and Humboldt State University consists of a Before and After Control Impact (BACI) study on two branches of Railroad Gulch with roughly equivalent area, bedrock geology, hillslope gradients, vegetation and management history. Harvest unit 2 in the East Branch of Railroad Gulch would be harvested (treatment) and the West Branch (the control) would not be harvested. Pre-treatment conditions in both branches have been closely monitored. Following harvesting 142 acres in the East branch using group and single tree selection and management prescriptions described in their ROWD, sediment discharge associated with road watercourse crossings and surface erosion, landslides, channel incision or aggradation, bank erosion, channel storage, suspended sediment, and turbidity will be monitored. Regional Water Board staff have been closely involved with review of the McCloud Shaw THP beginning with preconsultation with HRC forestry staff in November 2012. At that time, Regional Water Board staff were in the process of completing the draft peer reviewed staff report for the sediment TMDL for the Upper Elk River Watershed. During the initial preconsultations and throughout the subsequent THP review process, Regional Water Board staff brought up concerns regarding the potential for harvesting on the McCloud Shaw THP to result in increased sediment production and loading in the downstream impacted reach. These concerns were due to the proximity of the harvest units to the impacted reach and the vulnerability of the underlying bedrock to erosion and the presence of numerous

unstable areas and watercourses. The Study proponents and review team agencies strongly advocated for implementation of the Study. While remaining cautious of the potential for sediment discharge from harvesting operations, Regional Water Board staff supports this type of study as it will further our understanding of the impacts of current management practices.

- 22. Comment** – Vivian Helliwell states, “The Watershed Stewardship Program cannot yet mitigate for additional sediment. And, according to the Draft WDR, ‘In addition, limiting timber harvesting activities that are likely to generate additional sediment production in high risk areas is appropriate, and the Watershed Stewardship Program (see Finding 66) will take active measures to improve downstream beneficial uses.’ (29)

We disagree with the above statement. Actually, it is not appropriate to permit any “timber harvesting activities that are likely to generate additional sediment production in high risk areas.” The “receiving water conditions” are “zero assimilative capacity.” Assimilative capacity includes carrying capacity, and the WDR should not rely on the Stewardship Program that is still in the planning stages. Additional sediment generation will likely exacerbate fishery, safety and other loss of beneficial uses before any remediation downstream takes place.

Response: The Proposed Order for HRC’s timberlands is one component of the Regional Water Board’s overall strategy described in the Regional Water Board approved TMDL Action Plan for the Upper Elk River Sediment TMDL for addressing beneficial use impairment and attaining water quality standards. That strategy includes both regulatory and non-regulatory actions and recognizes that recovery will require a variety of approaches and efforts applied throughout the watershed, from the headwaters to the mouth. Regional Water Board staff recognize that no single approach is sufficient to improve a problem of the scale and complexity as the sediment impairment in Elk River. Incorporating an adaptive management framework is critical as well, as we recognize that the state of knowledge and development of restoration techniques will continue to evolve.

Regional Water Board staff recognize that in-channel or near-channel restoration activities in such a sensitive waterbody as Elk River must be approached with great caution, monitoring and technical analysis. Fluvial dynamics are complex and further perturbing an already severely impaired stream can lead to significant unintended consequences. As such, we are guided by the principal of, “first, do no harm.” We recognize that there is the potential that opportunities to implement feasible and effective restoration activities may be limited. However, we believe that the Watershed Stewardship Program has a sound strategy to assemble the right combination of technical expertise with local stakeholders as to maximize the likelihood of a positive outcome.

The Proposed Order includes substantial provisions to address controllable sources of sediment while allowing HRC to operate while progress on downstream restoration is advanced. In consideration of the severity of sediment impacts on the Elk River community and beneficial uses in Elk River, the current approach has struck a balance between pursuing options for downstream restoration and appropriately protective

water quality controls, which can be modified as the resolution of our understanding of the link between current practices and watershed conditions improves.

- 23. Comment** –Jesse Noel state, “[The August 30, 2016 Public Notice states] ‘While the mitigations described in the original analysis generally remain the same, and the new measures will be equivalent in mitigating or avoiding a potentially significant effect on the environment and themselves will not result in a potentially significant effect on the environment,’-----a) where does the original analysis differ? b) how are the new measures equivalent and by what metric? c) are the mitigations required to be effective? d) to what extent is the effectiveness of the mitigations enforceable? e) to what extent do the mitigations (after enforcement) assure that environmental injustice and environmental inequity will be fully avoided? Will the WDR avoid maintaining nuisance conditions, or will the WDR perpetuate nuisance conditions over an extended future?

Response – The original CEQA initial study dated December 4, 2015 evaluated the public draft Order released in November 2015. Revisions to the draft Order were made following the December 4, 2015 to January 18, 2016 comment period. Those revisions were reflected in the April 7, 2016 draft. Minor revisions were made to the draft Order prior to the May 12, 2016 hearing, again prior to the June 16, 2016 hearing, and to the current Proposed Order. While RWB staff maintain that the overall framework of the Proposed Order remains unchanged, specific mitigations have been refined. Following the June 16, 2016 hearing, and based on the changes made to the Order, RWB staff decided to recirculate the updated CEQA analysis to provide for additional public comment and review even if recirculation would not be explicitly required pursuant to CEQA Guidelines section 15073.5 (Cal.Code.Reg., tit. 23 § 15073.5.). The initial study and mitigated negative declaration dated August 30, 2016 differed from the earlier initial study, in that it evaluated the revised permit requirements, which are summarized in the Overview section at the start of this document. The basic structure of the Proposed Order remains the same and establishes stringent requirements designed to control sediment discharge from HRC’s timber operations. The result of the analysis remain that there will be no significant impact with implementation of mitigation measures.

As stated earlier in this document, the most significant differences between the two versions of the draft Orders analyzed are requirements for RMZ, harvesting in high risk subwatersheds, the modification of the 2% equivalent clearcut acres averaged over any 10 year period in any subwatershed from a firm limit to a threshold of concern, and wet weather requirements.

With the exception of the inclusion of language specifying that RMZs would not extend past a hydrologic divide, the revision to the RMZ requirements was addressed in the April 7, 2016 response to comments. The specification that RMZ not extend past a hydrologic divide is a reasonable and necessary addition that is not expected to result in any additional environmental impacts. RMZ are intended to protect watercourses from hillslope processes, such as mass wasting, surface erosion, and increased peak flows. A hydrologic divide effectively separates watercourses from virtually all upslope watershed

processes. The mitigations are enforceable requirements of the Proposed Order, which RWB staff believe will be effective and necessary to implement Basin Plan water quality standards. Where effectiveness of the mitigations can be clearly verified, they are enforceable. Due to the nature of the physical processes specific requirements of the Proposed Order are intended to mitigate, ongoing monitoring will be necessary to review mitigation measures to verify effectiveness. Section IV of the Proposed Order includes a robust monitoring and reporting program to inform the RWB on the effectiveness of the BMPs and mitigation measures in the Order in controlling non-point source pollution. Verifying the effectiveness of measures is essential in determining whether the Order is meeting its stated goals, and whether the management practices need to be modified or supplemented to control discharges. (State Water Board Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program. (2004).) In addition, HRC must comply with all applicable water quality standards, requirements, and prohibitions specified in the Basin Plan. In the event of any violation or threatened violation of the conditions of the Proposed Order, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under applicable state law.

24. Comment – Jesse Noel questions, “How does NCRWQCB intend to prevent controllable sources of discharge from harvest in the main stem portion from violating the basin plan or other laws? Is this an oversight, or does the WDR purposefully intend to harm the fishery and the residents?”

Response – The scope of the proposed Order is to establish requirements that HRC implement management practices designed to prevent and minimize sediment discharges from its timberlands to the maximum extent feasible. Sediment discharges from downstream properties outside of HRC’s timberlands are subject to all applicable water quality regulations through other regulatory (i.e. WDRs and Waivers, the TMDL Action Plan, enforcement) and non-regulatory (i.e. the Watershed Stewardship Program) mechanisms.

25. Comment – Jesse Noel states, “Water quality impacts from logging and associated activities primarily lead to: 1) an increase in sediment production and loading; and 2) elevated water temperatures. What relationship between recent tributary harvest and sediment production / loading is evidenced by 1) the ROWD and 2) the WDR analysis and 3) restoring older forest cover? At the Elk River sub-basin or tributary scale what is the range and mean increase in sediment production from logging and associated activities over the time period 2002 to present?”

Response – The Proposed Order is informed by the Technical Report, which included the sediment source analysis from RWB’s peer reviewed draft staff reports (NCRWQCB, 2013) and HRC’s Elk River/Salmon Creek Watershed Analysis Revisited (HRC, 2014), which is cited in its ROWD.

Chapter 6 of the Technical Report presents estimates of natural and land use-related sediment production and delivery processes in the Upper Elk River watershed based on information available from 1955 to 2011. They include estimates of sediment production from landslides, surface erosion, and channel erosion. Data sources included

both Palco's 2004 and HRC's 2014 watershed analysis, North Fork Elk Sediment Source Inventory (PWA 1998), surveys of natural and managed drainage networks (Regional Water Board 2011b), a BLM inventory, a GDRC inventory, and Cleanup Abatement Order inventories of management discharge sites.

The sediment source analysis is divided by sediment source categories, initiation (i.e., natural or land use-related), and time period (1955-1966, 1967-1975, 1975-1987, 1988-1997, 1998-2000, 2001-2003, and 2004-2011) and describes the land use influences on sediment production and delivery. Timber harvest is the primary past, current, and probable future land use in the watershed and is therefore the focus of the land use-related sediment source analysis. The sediment source categories affected by land use activities in Upper Elk River watershed that are identified and quantified include:

- In channel sources (low order channel incision, bank erosion, and streamside landslides);
- Road-related landslides;
- Open-slope shallow landslides;
- Land use-related sediment discharge sites;
- Post-treatment discharge sites;
- Skid trails;
- Road surface erosion; and
- Harvest (in unit) surface erosion.

Figure 3 (below) presents sediment loads by source category and time period. This illustrates the importance of land use-related streamside landslides, open slope shallow landslides, road-related shallow landslides, and road surface erosion as sources of sediment—these sources are largely attributable to timber harvest operations and associated activities. Also notable is the reduction in sediment delivery over time from these specific source categories (except streamside landslides). Sediment delivery attributable to land use activities has reduced over time from a high of 85 percent in the 1988-1997 period to a low of 68 percent in the more recent 2004-2011 period.

RWB staff anticipate continuing reductions in sediment production resulting from implementation of the Proposed Order and the change to uneven aged management in 2008. Ongoing in-stream trend monitoring conducted pursuant to the Monitoring and Reporting (section IV of the Proposed Order) as well as other monitoring activities throughout the watershed are expected to provide information on the effectiveness of management practices in improving watershed conditions, or demonstrate that additional restrictions are warranted.

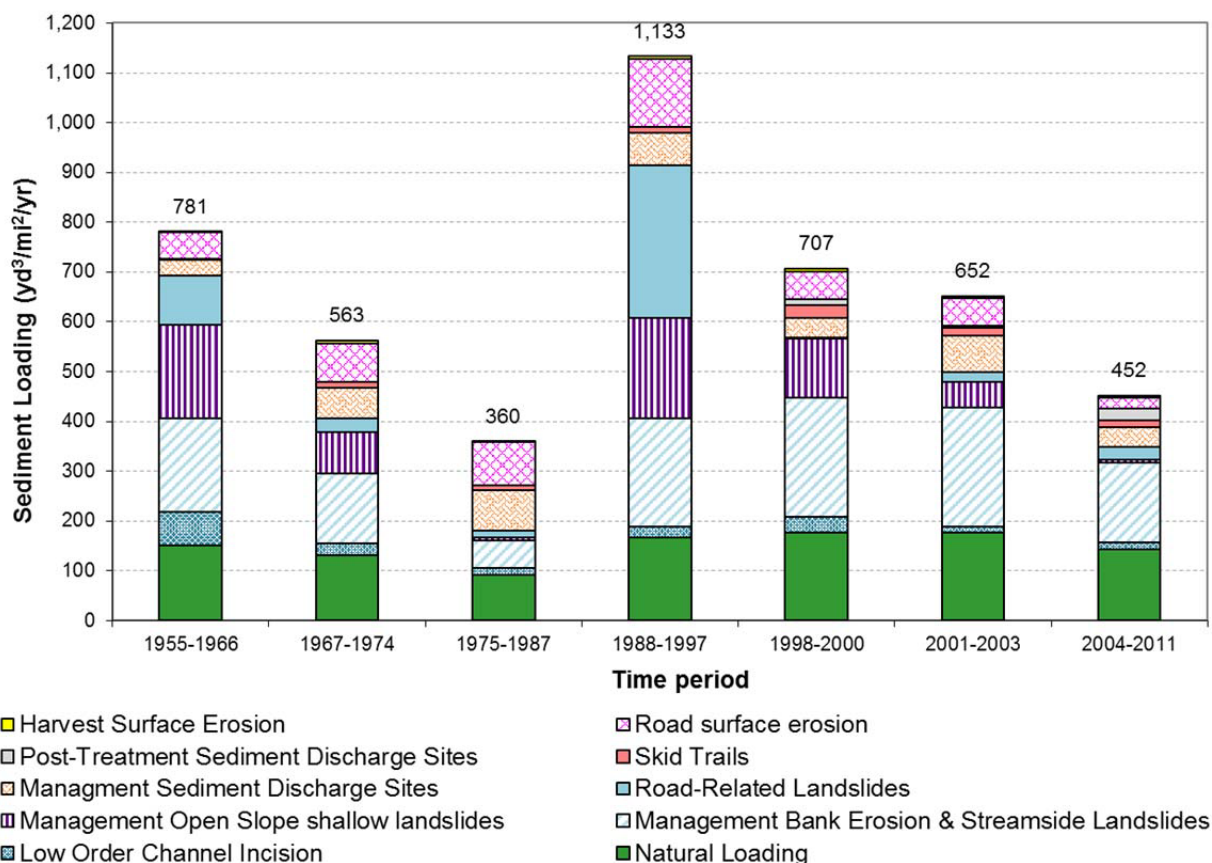


Figure 3. Upper Elk River loading by source category for analysis time period (Tetra Tech, 2015)

26. Comment – Kristi Wrigley and Vivian Helliwell state that the requirement in section IV.A.1.a.ii that HRC staff inspect roads following any storm event that generates 3 inches or more of precipitation in a 24-hour period is inadequate. The commenters state the storms that generate 3 inch of rainfall in 24 hours are not common, and that more frequent smaller storms (i.e. greater than 2 inches in 24 hours) can generate sufficient runoff as to cause erosion and sediment discharge.

Response – The commenters are correct that 2 inches of rainfall occurs more frequently than 3 inches in 24 hours and that if the inspection trigger was the former, HRC would conduct inspections more frequently. The proposed inspection trigger of 3 inches of rainfall in 24 hours is directly from HRC’s HCP and included as an enforceable requirement of the Proposed Order. Annual and storm triggered inspections are intended to ensure that HRC staff inspect all roads throughout their ownership at least annually, which is standard hillslope target in the majority of TMDLs from throughout the North Coast region, and during large storm events. Such inspections provide feedback to HRC staff on how their management practices for roads are functioning and identify sites that need correcting. Sites that require corrective action may be able to be

treated immediately, such as plugged waterbars or small to moderate sized culverts. Some sites may require use of heavy equipment to correct, and therefore, could be treated during the winter period.

While annual and precipitation triggered inspections are critical tools for early identification of small problems to prevent them developing into catastrophic failures, the best strategy for preventing sediment discharge from roads is “stormproofing” [from Finding 45 of the Proposed Order], or implementation of practices designed to:

- Hydrologically disconnecting road segments from watercourses and minimizing concentration of surface runoff by installing drainage structures at sufficient intervals to disperse runoff so as to avoid gully formation and minimize erosion of the road surface and inside ditches;
- Identifying and treating potential road failures (mostly fill slope failures) that deliver sediments to streams;
- Watercourse crossing shall be designed to minimize the potential for crossing failure and diversion of streams. Watercourse crossings shall be sized adequately to accommodate estimated 100-year flood flow, including wood and sediment; and
- Avoid wet weather road use or limit it to well rocked, paved, or chip sealed surfaces.

As such, RWB staff believe the requirement that HRC inspect their roads following any storm event that results in 3 inches of rainfall in a 24-hour period is protective of water quality.

27. Comment – Vivian Helliwell states, “Staff tells us that the public is responsible to find and notify them of connected runoff from roads to the stream. This is an impossible task for the public to perform. HRC and HCP monitors, or Region 1 enforcement, are better equipped to follow the leads provided and track down problems that need to be fixed.”

Response – The commenter is correct, it is the responsibility of HRC staff and HCP monitors, as well as responsible agencies such as the RWB and CAL FIRE, to inspect roads and identify any sediment discharge sources. The comment is based on a recent discussion with RWB staff who stated that if any members of the public observe any discharge, or potential discharge occurring on HRC’s timberlands, they should document it and provide the information to RWB staff. RWB staff routinely follows up on such information by conducting inspections.

28. Comment – Kristi Wrigley states, “The canopy cover needs to be considerably more than the old 75 to 150 ft. basal area that was relied on. Elk River watershed soils are all very erosive and at this point need a much higher degree of protection to achieve any success at staying in place. A 250 basal area [or whatever equivalent % cover that converts to] is a minimum that should be maintained throughout the entire watershed above where residents live.”

Response – The Proposed Order increases RMZ widths and canopy retention for Class II and III streams, combined with a provision that HRC utilize mostly single tree or group selection, and no clearcutting. In addition, the Proposed Order establishes watershed- and subwatershed-wide harvest limitations as well as geologic review of all harvest related activities and other provisions designed to minimize surface erosion, mass wasting, and sediment production from increased peak flows. Regional Water Board staff believe the combined effect of the measures required by the Proposed Order to be protective of water quality.

29. Comment – Jesse Noel asked, “Does the increased saturation and pore pressure and the fewer large roots and little or no deep rooting increase propensity for debris sliding? Soil creep? Pipe collapse? What happens when pipes collapse: does the blockage cause saturation upslope to skyrocket and increase propensity for torrenting? Do large roots that rot, or burn out, form the underground drainage flow paths known as pipes? Does high levels of root strength serve to keep pipes from collapsing? Is soil pipe collapse why Railroad Gulch has been experiencing such severe torrenting and sedimentation of late?”

Response –Subsurface erosion of soil via soil pipes appears to be prevalent in Upper Elk River watershed, at least in the Wildcat Group (PWA 2000; Buffleben 2009; Regional Water Board 2011). Soil pipes are a connection of macropores in the subsurface soils. These macropores run parallel to the soil surface and are a conduit for subsurface runoff. Timber harvesting can reduce transpiration and rainfall interception, increasing the amount of subsurface flow generated during storms; and road construction and heavy equipment use can compact soils and disrupt soil pipes (Cafferata and Reid 2013). These alterations to flow through soil pipes can lead to internal erosion of the pipe, which can thus produce daylighted gullies by tunnel collapse (Buffleben 2009; Cafferata and Reid 2013; SHN 2013). The eroded material can clog soil pipes, causing pore water pressure buildup inside the pipes that can result in landslides, debris flows, embankment failures, or of ephemeral gullies (Fox et al. 2007).

Regional Water Board staff believe the Proposed Order includes provisions sufficient to prevent disruption of soil pipes. However, it is likely that soil pipes throughout the watershed have already been disrupted or collapsed by past timber operations and will continue to produce fine sediment for many years as they form new, stable pathways. Collapsed soil pipes may result in loss of shear strength and increase localized saturation in shallow soils, leading to mass wasting.

As for the commenter’s question whether the debris torrent reported in the Railroad Gulch BMP Annual Report for water year 2014-2015 was related to soil pipe collapse; no forensic investigation has been conducted, and therefore, the cause of the debris torrents is unknown.

30. Comment – Jesse Noel asked, “Doesn't HRC model soil creep rates based on the assumption that the rate cannot be altered by anthropogenic impacts, and that soil creep accounts for the bulk of discharge to Elk River?”

Response – Section 4.2.1 of HRC’s ERSC WA Revisited, prepared in June 2014, describes their methodology for estimating rates of soil creep. Soil creep is considered one of the dominant natural surface erosion processes and can be used as a proxy for estimating bank erosion rates. Soil gradually moving down slope functions as a continuous conveyer belt to watercourses located at the base of the hillslope. Material reaching the watercourse then enters the fluvial system through bank erosion processes. Under equilibrium conditions, sediment supplied to stream banks via soil creep is equal to the bank erosion rate (Reid and Dunne 2003). The ERSC WA categorizes sediment delivery from soil creep as the primary background sediment input and estimates that it represents 42% of sediment delivery from surface erosion throughout the watershed.

31. Comment - Jesse Noel states, “Restoration and remediation efforts in the Upper Elk River as well as the downstream impacted reach, combined with the additional layer of environmental protection provided by the Order are expected to ensure that existing cumulative water quality impacts are abated over time, and beneficial uses are ultimately restored and protected.’ This statement is a travesty (false flag) because it is obvious that by converting the channel from the natural deeply incised channel with riparian forest to a wide V shaped channel by so called “*restoration and remediation*” will obliterate the shade cover and root strength mechanism that provide habitat that was so good for coho. The Residents’ alternative that is reasonably designed to restore and remediate (in a feasible and practicable period of time and money) is to create a community forest that is logged from below to restore old growth levels of forest that maximize the biological potential---not just for fish and wildlife, but to maximize the sequestration of carbon, prevent methane release by avoiding compaction and bring back the river and fishery---while providing public access. The jobs that were sacrificed when timber destroyed the highly productive forest cover would return, and tourism and fishing would increase. Ironically, this alternative is the only project that can restore and remediate.”

Response –Regional Water Board staff has considered all feasible and appropriate measures to adequately condition HRC’s activities in the Upper Elk Watershed so as to attain beneficial uses without foreclosing all timber harvesting and economic use of HRC’s land.

32. Comment – Vivian Helliwell and EPIC state that enrollment should continue to be required and not automatically rescinded after five years unless and until considerable and measureable progress toward water quality objectives and support of the beneficial uses is achieved.

Response - [From April 7, 2016 response to comments] The Regional Water Board is moving towards watershed or ownership based timber WDRs. Such an approach provides efficiencies to landowners and agencies and can be better suited to addressing large scale impacts such as road systems and cumulative watershed effects. Several existing watershed or ownership-wide WDRs, including those for HRC in Bear Creek and Jordan Creek and for the majority of Green Diamond Resource Company’s timberland, provide for automatic enrollment of individual THP upon approval by CAL

FIRE. Regional Water Board staff review all THPs in the North Coast Region and inspect a subset of THPs. Recommendations made by Regional Water Board staff based on site specific field review or other technical information pertinent to a proposed plan (such as TMDL findings) may be accepted by the plan submitter or forwarded by CAL FIRE during second review. Generally, THP water quality issues are resolved during the review process. If neither the plan submitter nor CAL FIRE agree to Regional Water Board recommendation, additional recourse is available through the THP review and approval process, including nonconcurrency pursuant to 1035.5(i), Head of Agency Appeal, or pursuant to PRC 4582.71, which specifies that a timber harvesting plan may not be approved if the appropriate regional water quality control board finds, based on substantial evidence, that the timber operations proposed in the plan will result in a discharge into a watercourse that has been classified as impaired due to sediment under CWA section 303(d). It is essential that Regional Water Board maintain its authority under Porter-Cologne to ensure that timber harvesting activities do not result in further degradation. Regardless of whether the enrollment process entails the need for a letter confirming enrollment, as is proposed for the first five years following adoption of the Order, or plans are automatically enrolled following approval by CAL FIRE, the Regional Water Board Executive Officer may withhold or terminate enrollment of a plan at any time if it is determined that the plan does not comply with the terms and conditions of the Order or may result in further water quality degradation. This determination may be made based on considerations such as site specific observations by staff, additional information or analysis, or proposed operations in high risk areas or above sensitive receiving waters.

In the case of the Elk River, application and enrollment of individual plans is the most efficient manner to achieve that goal, at least for the near term as the proposed requirements and associated watershed restoration efforts are implemented. Individual THP enrollment should not be considered a hardship or imposition. The majority of timberland owners in the North Coast Region routinely apply for, and receive coverage for individual THPs under the General WDR, Order No. R1-2004-0030. This process has been in place now for almost twelve years and it works smoothly and efficiently. HRC currently must enroll THPs individually on its timberlands covered by the current WDRs in Elk River and Freshwater Creek.

33. Comment – HRC requested that RWB modify the method used to identify areas that pose a high risk of sediment production from the proposed subwatershed based relative ranking to a risk designation based on the extent of areas underlain by the Hookton Formation.

Response – During the initial stages of WDR development, Regional Water Board staff developed a draft risk model of potential sediment discharge on a subwatershed scale. The draft model calculates risk as the summed product of risk factors and the associated consequence to water quality. It was designed to assist in designating the portions of the Upper Elk River as high, medium, and low risk of management related sediment discharge that could be used to inform appropriate levels of management activity. The draft model was run using varying combinations of input factors in order to test the sensitivity of the draft model to specific parameters. Input factors used in

the development of the draft model include physical watershed parameters such as geologic substrate and modeled landslide hazard, as well as management impacts, such as harvest history and changes in peak flow from canopy removal, and empirical sediment production estimates. Regional Water Board staff shared with HRC the draft model and several preliminary output maps generated using model predictions and various input parameters to provide them with an opportunity to review and comment on the proposed approach. Preliminary model runs consistently identified elevated risk of sediment discharge in the five subwatersheds predominantly underlain by the Hookton Formation. These five subwatersheds, Clapp, Tom Gulch, and Railroad Gulch, McCloud, and Lower South Fork Elk, are recognized as sensitive bedrock terrain in HRC's Elk River/Little Salmon River watershed analysis. Both the Regional Water Board and HRC staff recognize that these five subwatersheds are highly susceptible to erosional processes and generate high sediment loads. Based on the broad overlap between the preliminary output of Regional Water Board's draft risk model and HRC's ROWD, Regional Water Board staff determined that it would be beneficial and consistent with water quality protection to align our approaches to the extent possible. In addition, there is broad overlap between the areas designated as high risk based solely on geologic substrate and the subwatersheds designated as high risk based on RWB's relative risk ranking using geologic substrate, modeled landslide hazard, and sediment production estimates. Regional Water Board staff are of the opinion that the relative risk ranking based on subwatershed landslide hazard as well as sediment production estimates results in a more robust method than only geology.

34. Comment –Jesse Noel states, “please include this as addendum to my WDR comments: <http://kottke.org/16/09/the-internet-of-trees-how-trees-talk-to-each-other-underground>”

Response – No response necessary.

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