Humboldt Redwood™

December 2, 2013

Chairman David Noren and Members of the Board
North Coast Regional Water Quality Control Board
5550 Skylane Boulevard, Suite A
Santa Rosa, California 95403

RE: Peer Review Draft Staff Report to Support the Technical Sediment TMDL for the Upper Elk River

Dear Chairman Noren and Members of the Board:

Humboldt Redwood Company, LLC (HRC) owns and manages approximately 22,000 acres of Timber Production Zoned (TPZ) timberlands in the upper Elk River watershed. As the largest industrial timber landowner in the Upper Elk River watershed with operations potentially to be affected by findings and implementation strategies described in the Peer Review Draft Staff Report (PRDSR), HRC has a significant interest that the scientific basis cited in development of the Upper Elk River sediment TMDL, and any subsequent waste discharge requirements, be inclusive of all relevant data generated and reflective of current management practices employed in the watershed, be objective, and fully disclose scientific uncertainties.

Following the June 2013 release of the PRDSR, HRC's science department undertook review of the report. To better understand the rationale and validity of underlying assumptions and calculations used to establish TMDL load allocations (targets), and out of necessity considering the sheer number of studies, reports, and publications referenced or otherwise relevant to the PRDSR, we contracted with third party expertise including Integral Consulting, Inc. and Dr. Lee MacDonald (see attached bios).

While this review is currently ongoing, we recognize the NCRWQCB's desired timeline for releasing a Public Review Draft Technical TMDL Staff Report along with draft waste discharge requirements in a single-action in the spring of 2014. With this timeline in mind, we wanted to formally inform the Board that HRC has significant concerns and reservations regarding specific assumptions, calculations, and policy positions put forth in the PRDSR. We are concerned that the report is not inclusive of, nor appear to objectively consider, all readily available and applicable science and relevant data. As a result, current sediment loading allocations appear inaccurate or misleading in several instances, and recommended TMDL targets requiring an additional 97 percent or greater reduction are physically unattainable. Also of great concern is policy recommendation put forth suggesting a

significant reduction in allowable annual harvest as necessary to attain targets, and that this rate of harvest is to be in part, dependent upon downstream sediment removal activities.

While we have, and will to continue to address these concerns in detail directly with staff, we want to share some of the primary concerns with the Board and Executive Officer, at this time as follows:

Use of Little South Fork Elk River as Reference Watershed

The PRSDR uses a very small basin with no history of anthropogenic influences save for fire suppression, referred to as the Little South Fork Elk River (LSFER), as the reference by which to evaluate background sediment yield and establish TMDL targets. This approach is statistically problematic and results in TMDL allocations that physically cannot be achieved *regardless of whether or not timber management is actively occurring in the watershed* (PRSDR Table 5.5). In part this is because most of the PRSDR identified management-related sediment sources persistent on the landscape are related to historic practices (pre 1999 Habitat Conservation Plan; pre 1974 Forest Practice Rules). In order to achieve load allocations derived from comparison of the historically managed landscape to the unmanaged and recently undisturbed reference sub-basin, one would have to physically erase the land use history of the last 130 years throughout the managed Upper Elk River TMDL area.

As a result of combining past and present sediment sources, the TMDL establishes unrealistic targets (e.g. a 97-98% reduction in management related inputs), which appear to in large part disregard the success in sediment control already occurring on HRC lands due to a series of changes in practices beginning most significantly in 1999, including measures required by the NCRWQCB itself in subsequent years.

While a goal to remediate all 'controllable' sediment effect of historic practices is generally consistent with the current restoration effort ongoing in the watershed, requiring a reduced rate of harvest as part of this strategy is without precedent and highly speculative. Please consider that the majority of sediment loading the PRSDR identifies as management related based on comparison of the historically managed landscape to the LSFER sub-basin originates from in-channel or immediately adjacent stream bank. These are areas where HRC conducts little to no timber harvest under current enforceable regulation, and available data suggests these sources are not the result of forest management practices occurring in the watershed now or over the last 15 years.

Other concerns over use of the LSFER Headwaters Forest sub-basin as the sole point of reference for 'management' compared to 'natural' sediment source analysis, and the single

hydrology monitoring station (sta. 534) at the bottom of the 1.17 mi^2 LSFER headwater sub-basin for establishing the background sediment yield for the entire 44.2 mi^2 TMDL watershed include:

1. The paucity of monitoring record (2004-2007; 4 years) which fails to account for the fact that monitoring annual sediment yield is typically a highly-skewed, lognormal distribution driven by infrequent large events (e.g. extreme erosion triggering storm events, wildfire);
2. The calculated sediment yields are extremely questionable due to the poor data set and high level of statistical uncertainty surrounding the calculated yields relative to stage-discharge relationship, as well as the relationship between field-measured turbidity and suspended sediment concentrations;
3. Uncertainty regarding how Staff calculated the sediment yields for the LSFER as presented in Table 5.2. The annual equations listed in Table 1 of Appendix 5A (relating turbidity to suspended sediment concentrations) are very different from the equations developed by HRC using the valid field data, and the sediment loads presented in the PRSDR are much lower than the values calculated by HRC's physical science department despite being based on presumably the same samples;
4. The Yager Formation (y1) geology underlying the LSFER 'reference' sub-basin is a harder, more competent substrate than the undifferentiated Wildcat Group sediments (i.e. fine sandy siltstone and claystone that apart easily) that underlay the majority of the watershed with which yields and input source analyses are being compared. Approximately 78 percent of the entire Upper Elk River TMDL area is underlain by the softer substrate Wildcat Group and Alluvium/terrace compared to 22 percent underlain by the harder substrate Yager Formation and Franciscan mélange geologies found in the very upper reaches of the watershed;
5. The 'reference watershed' is simply too small a sample size to accurately depict the range of environmental conditions and processes found in the much larger Upper Elk watershed TMDL area. The monitored headwater portion of the LSFER is 1.17 mi^2 and represents approximately 3 percent of entire 44 mi^2 Upper Elk River TMDL watershed area for which it is used as a base-line reference.

<u>Proposed Rate of Harvest based upon Klein et al. (2012)</u>

Review by both Dr. Lee MacDonald and Integral Consulting found no clear technical basis for the PRSDR's proposed harvest limitation of 0.4 percent of an ownership as necessary to achieve the targeted load allocations. Instead this strategy appears to originate from inference to a single regional paper (Klein et al. 2012). We respectfully request the Board recognize that the correlation between rate of harvest and turbidity presented in the Klein

study was limited to a single water year (2004/2005) and a harvest rate that occurred 10-15 years prior (early 1990s). As such, reliance upon this paper discounts the considerable evolution of best management practices that have occurred since the 1990s. Moreover, the paper itself appears to select a single hydrological year in which statistical significance can be found rather than consider the full monitoring data record available for analysis.

As you are aware, HRC's timberlands in the upper Elk River watershed have been managed under a very conservative set of forestry prescriptions since 1999. These enforceable watershed conservation measures were established in consultation with the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and California Department of Forestry and Fire Protection (CAL-FIRE), and designed explicitly for the conservation and restoration of endangered salmon runs (HRC HCP 1999). In coordination with effectiveness monitoring required by this HCP relative to sediment-related trends in water quality, the Klein et al. statistical analysis was replicated using the full HRC data set from Elk River and Freshwater Creek including 22 monitoring stations and a 9 year monitoring record. The analysis found no indication that rate of harvest *systematically* influenced sediment yield during the 2003 to 2011 monitoring interval, but did find a *statistically significant decline in sediment yield* occurring within these two watersheds over that time period (Sullivan et al., 2012).

As stated on pages 5-6 of the PRSDR, federal law requires that all existing and readily available data be included in the evaluation of water body impairment and the development of associated TMDLs. The Sullivan et al. report must be considered by the NCRWQCB as it contains more recent data and includes an analysis that covers more years of stream monitoring than was utilized by Klein et al. In addition, it should have been made available during peer review.

Also relevant, are the recent findings regarding the effectiveness of best management practices (BMPs) on preventing harvest related mass wasting. These are considered relevant as the 10-15 year lag between harvest rate and effect on turbidity reported in Klein et al. 2012 were interpreted to represent a potential link to increased landsliding following root decay. As you are aware, in 2006 the NCRWQCB established Waste Discharge Requirements for the Elk River watershed that limited annual cumulative harvest to a specified acreage based on a modeled assumption that such harvest limitation would result in no more than an average of 154 cubic yards per square mile per year of delivery from harvest-related landslides. Presumably this amount was considered acceptable for downstream watershed recovery. HRC's predecessor in interest, and subsequently HRC has abided by this harvest limitation and associated 'Tier 1/Tier 2' WDR regulatory

framework. To date, annual rate of sediment delivery from all areas harvested in the Elk River watershed since the year 2000 utilizing HCP hillslope management prescriptions, with added NCRWQCB requirements in 2006, has been approximately 1 cubic yard per mile^2 per year, significantly less than the 154 cubic yards modeled by staff. This data demonstrates the effectiveness of BMPs to date in landslide avoidance, and raises questions regarding the assumption that sediment-related cumulative effect from current rate of harvest is somehow responsible for the persistence of downstream flooding and domestic water supply concerns, considering these physical realities persist despite effective upstream control of forestry-related inputs.

Bank Erosion and Small Streamside Landslide Management Allocation

The PRSDR reports an estimate of 431 tons per mile^2 per year of bank erosion and streamside landslide related delivery, which represents nearly two-thirds (63%) of combined management and natural sediment loading (Table 4.32). The report attributes 88 percent of these two sediment source categories as *management-related* rather than occurring as a result of natural processes. However, this finding appears inconsistent with an extensive 2012 stream survey of HRC's ownership in the Upper Elk River watershed managed by SHN Consulting Geologists and Engineers. This survey effort covered nearly 26 miles of stream reach representative of varying geologies and land use intensities and reported the following:

> *Streamside landsliding and bank erosion appears to be occurring in the subject stream segments independently of recent management. During our surveys, we interpreted that primary causal mechanisms were most frequently related to unstable geology and natural flow deflection; causal mechanisms related to recent management were virtually non-existent. Contemporary management is severely restricted in riparian areas, so we observed no apparent interaction between streamside slopes and upslope management. In every stream segment we walked, a broad, intact riparian zone was present to buffer the stream from adjacent management areas.* (SHN 2013, page 6)

The PRSDR calculations used to determine overall loading from bank erosion and small streamside landslide sources, and attribution of nearly all of this loading to management, appear to rely upon a finding that drainage densities on managed timberlands are 3-fold that found in the LSFER reference sub-basin. This assumption is apparently based on data and analysis from Buffleben (2009). Uncertainties regarding Buffleben's 2009 PhD dissertation, including but not limited to small sample size with, as of yet unexplored statistical implications, are of concern to HRC in light of the fact the HRC GIS database, much of which has been field verified through timber harvest plan layout activity, reports a

significantly lesser drainage density than that reported in the PRSDR (approximately 10 mi/mi^2 versus 16 mi/mi^2).

Also of concern, and not fully disclosed, is that the surveyed reaches in the LSFER, from which estimates regarding management influence on these processes are derived, are underlain by a different geology than the majority of the watershed to which rates are being compared. Pacific Watershed Associates (PWA), who conducted the surveys cited in the PRSDR, noted that sample variability for these types of studies can be large and that findings in one location may not be easily extended to nearby sub-watersheds *even in the same watershed* (PWA 2006; PRSDR Appendix 4-E).

While the PRSDR estimates that streamside landsliding and bank erosion deliver approximately 50 percent of sediment *in an unmanaged setting* such as the LSFER, the report makes no mention of the benefits provided by these natural processes relative to contribution of large wood and spawning substrate. Large wood is recognized as a basic necessity of Coho habitat, particularly in uplifted marine sediment dominated low gradient coastal streams where wood functions to create habitat complexity in the absence of boulders and more competent geology. The fact that small stream side landsliding and bank erosion are the primary hillslope mechanism for sediment delivery reported in the PRSDR, *instead of delivery from failing road systems or harvest related landslides and surface erosion might more appropriately be interpreted as evidence of an ongoing positive trend in management likely leading to watershed recovery over time.*

HRC does not dispute that some reaches within the watershed may be inherently unstable, or have had stability adversely effected as a result of pre-1974 forest practices that utilized stream channels for log transport; and forestry practices above and adjacent such reaches need to consider these conditions during planning and operation implementation. However, the SHN report also notes:

> *In general, most of the stream segment surveyed is associated with relatively low rates of streamside mass wasting relative to other watersheds within the HRC ownership. Field surveys identified just over 6,500 cubic yards of sediment delivery during a field survey of nearly 26 miles of stream length. Because the Elk River is a coastal watershed with moderate topographic relief, stream valleys tend to have broad cross-sections with wide valley bottoms. As such, stream impingement on valley sidewalls is infrequent and undercutting is rare. This condition is in contrast to steeper, more deeply incised stream valleys (the upper Eel, Bear, and Mattole watersheds, for example) elsewhere on HRC property.* (SHN 2013, page 5)

While it is our understanding that the SHN survey results were considered by your staff in development of streamside landslide and bank erosion delivery rates presented in the PRSDR, the final SHN report is not included as an appendix nor was it provided as part of the peer review despite being completed and available in January of 2013.

Fisheries Evaluation

The PRSDR presents a very limited discussion of upper Elk River's contemporary fisheries and makes no reference of recent surveys conducted by the California Department of Fish and Wildlife (CDFW) in cooperation with the National Oceanic and Atmospheric Administration (NOAA) regarding steelhead and salmon spawning ground surveys conducted as recent as 2012. Spawning ground surveys conducted in the watershed since 2003 have indicated Coho Redd Densities (# of redds per linear mile of stream reach) consistent with those throughout the Southern Oregon Northern California (SONC) region and outperforming regional averages over the last two years (2011-2012).

Peer Review

While apparently consistent with staff policy, conducting the peer review prior to vetting the PRSDR's contents with affected stakeholders arguably limits the value of the review as important information, such as that described above is not available for peer reviewer consideration. We note the peer review did not include any statistical analysis of the various reports, studies, or subsequent assumptions and calculations presented in the PRSDR. Nor was it comprehensive in nature, as individual sections of the PRSDR were provided to reviewers but none were provided the report as a whole.

Conclusion

HRC conducts its operations in a responsible and effective manner that prevents and minimizes *management related* sediment delivery to the stream system consistent with NCRWQCB waste discharge requirements and existing clean up and abatement orders inherited from the previous landowner in interest. Through regulation and voluntary policy, HRC has successfully reduced delivery from its contemporary forestry operations to a scientifically estimated *10 percent of the annual total Upper Elk River watershed load*. The company has mechanically removed or stabilized over 325,000 cubic yards of sediment since 1999 in this watershed in the process of decommissioning 43 miles of historic poorly constructed road and storm-proofing the vast majority of the remaining road system used in ongoing commercial forestry operations; operations very much consistent with the upper watershed's TPZ zoning. Also, HRC abandoned the clear-cutting practices of the previous landowner in favor of uneven-age selective harvest practices which retain moderate to high levels of forest canopy post harvest.

These actions have and will continue to prevent the downstream transport of substantial volumes of sediment to low gradient reaches where it could otherwise adversely affect fisheries, domestic water supply, and flood frequency. Thanks to a robust effectiveness monitoring program, these practices *are known* to have led to a reported small but *statistically significant* decline in suspended sediment yield, and a very significant reduction in harvest-related landslide and surface erosion sediment input relative to past practices of the 1990s and prior. While fisheries habitat conditions appear to be improving, contention over domestic water supply quality and 'nuisance' flooding remains despite the company's adherence to these waste discharge requirements and clean up and abatement orders established by the NCRWQCB nearly a decade ago, intended to remedy the downstream situation.

The regulatory approach used in the watershed to date is generally consistent with the original process envisioned by the Clean Water Act for dealing with non-point sources, such as silviculture. Reliant upon Best Management Practices (BMPs) it is essentially an adaptive management approach, as it recognizes the inherent uncertainty in quantifying values such as sediment sources and yields, and then linking the sources to a specific water quality parameter or effect on a designated beneficial use. It is this BMP approach combined with effectiveness monitoring and adaptive management that has successfully reduced sediment delivery from contemporary forestry operations in the Upper Elk River watershed over the last thirteen years to approximately 10 percent over background when 'background' is defined as *what sediment loading would otherwise occur with no contemporary forestry operations in the watershed.*

However, the current draft TMDL as presented in the PRSDR appears to ultimately contradict this approach, as, in addition to some questionable new BMP recommendations in terms of benefit, it proposes a scientifically unfounded 'step-wise' rate of harvest. This 'stair-stepping over time' rate of harvest is tied to physical achievement of very specific load allocation targets that in many instances are simply not physically attainable, or not likely attainable within the time periods forecast. Nor has the PRSDR presented a convincing case that the proposed reduction in harvest is demonstrably linked and necessary to achieve and sustain the desired beneficial uses and water quality goals. In fact, the record suggests that it is not, as previously set harvest limitations and clean-up and abatement order requirements have not resulted in substantially improving downstream conditions relative to domestic water supply and flooding despite being in place for eight years and demonstrably effective in sediment control.

HRC is committed to working with staff in the establishment of reasonably attainable TMDL load allocation targets based on the best available science. Towards this end, a technical report further detailing the concerns introduced in this letter, along with a few others, is being prepared. It is our hope that collaborative review of these matters will result in a Public Review Draft Technical TMDL Staff Report that can be generally supported by the scientific community involved with forest management and water quality regulation.

We look forward to continuing to work with your staff in the development of fair, effective watershed-wide waste discharge requirements for our ownership in the Upper Elk River reflective of current practices and policies; and importantly, in the ongoing Elk River Recovery Assessment and Pilot Project and any other reasonable downstream efforts that might provide the most immediate and long term solutions to the issues of greatest concern effecting downstream residents.

Best regards,

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Third-party Expert Bios

Dr. Lee MacDonald is the Senior Research Scientist for the Natural Resource Ecology Laboratory at Colorado State University and a tenured professor in the Department of Ecosystem Science and Sustainability. He has a B.S. in Human Biology from Stanford, a M.S. in Resource Ecology from the University of Michigan, and a Ph.D. in Forest Hydrology from the University of California at Berkeley. Dr. MacDonald's research focuses on the effects of forest management, fire, and roads on runoff, erosion, sediment yields, and stream channel characteristics. He has become increasingly involved in erosion and sedimentation issues, in channel monitoring, and cumulative watershed effects. Some current research projects relevant to this general topic include road erosion and sediment delivery in the U.S. Virgin Islands, the effects of fire on runoff and erosion in the Colorado Front Range, erosion on forest lands in the Sierra Nevada of California, and monitoring the effects of changes in flow and sediment loads on stream channels. These types of field studies have then been leading to more conceptual investigations into the analysis and management of cumulative effects, and the extent to which spatial scale determines the magnitude and detectability of cumulative effects.

Integral Consulting Inc. is a national, multi-disciplinary engineering/science firm with expertise inhydrology and hydraulics, water quality investigations, watershed analysis, total maximum daily load (TMDL) development, waste load allocation, aquatic biology, wetland ecology, and water supply evaluation. Integral staff reviewing the Elk River TMDL consists of state licensed engineers, geologists, and hydrologist with experience in remedial investigations and feasibility studies relating to watershed analysis and water quality. Their professional backgrounds include stream flow and runoff modeling used to predict hydrodynamic flows, sediment erosion, transport and deposition, and water quality. Staff expertise also involves surface water quality projects with emphasis on site characterization, remedial design and implementation, regulatory negotiation, and litigation support.