

Comments on “Review of Green Diamond Resource Company’s Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects, June 2012”

By: Randy D. Klein, Hydrologist, Redwood National and State Parks
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(Sept. 10, 2012)

The comments that follow respond to a document written, I believe, by Kaete King, staff engineer with the North Coast regional Water Quality Control Board (NCRWQCB), though the document (herein called the ‘Review’) neglects to list the authorship. The ‘Review’ argues that forest practices in current use by Green Diamond Resource Company (GDRC) keep cumulative effects to a minimum, or at least to a level that meets the limits set forth in the North Coast Basin Plan (NCRWQCB, 2011). It advocates for granting of a ‘Waiver of Waste Discharge Requirements’ (WWDR) for GDRC while ignoring recent research demonstrating the importance of considering and regulating harvest rate in protecting water quality. Ironically, the ‘Review’ attempts to refute findings in Klein and others (2012) which was based upon a report provided to and funded by the NCRWQCB (Klein and others, 2008), and one whose co-author was, until being promoted to a position with the State Board, a staff member of the NCRWQCB, Dr. Matt Buffleben. Quotes from the ‘Review’ are shown in *italics*, below.

From page 33 of the ‘Review’, it states: *“It has been well documented that forest roads can cause significant increases in erosion rates within a watershed (Haupt 1959, Gibbons and Salo 1973, Beschta 1978, Rice et al. 1979, Cederholm et al. 1980, Reid and Dunne 1984, Furniss et al. 1991, Sidle et al. 1985; Montgomery 1994; Veldhuisen and Russell 1999; Sidle and Wu 2001; Brardinoni et al. 2002).”* I have no argument with this. Roads are being appropriately re-engineered by GDRC to reduce sediment threats. However, that cannot be used to justify ignoring the well-documented sediment threats triggered by removing trees from steep hillslopes (Reid and others, 2010; Reid and Keppeler, 2012; Klein and others, 2012; Klein and others, 2008; Klein, 2003).

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“Contrary to our expectations, some research results (Reid and Dunne, 1984; Anderson, 1970; Anderson, 1975; Anderson, 1979), and conventional wisdom, road variables added little statistical value beyond harvest rate and drainage area in explaining turbidity variations, possibly resulting from incomplete and/or inaccurate road data. For example, road lengths are probably underrepresented in ‘off-the-shelf’ data sets used here. Perhaps more accurate road data would have elevated the importance of road variables in explaining turbidity. But roads were indirectly accounted for in that they are closely linked to harvest rate: the density of the road network and the intensity of road use typically rise with increasing harvest rate. The correlations in the full data set were $r = 0.80$ ($n = 28$, $p < 0.001$) between 15-year mean annual harvest rate and basin-wide road

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Also from pages 33-34 of the 'Review': "*Their results indicated that harvest rate and drainage area explained much of the observed variation. However their analysis and conclusions were potentially flawed in a variety of critical ways*".

"1. Their analysis included only a single year of turbidity data (WY 2005) so they were not able to evaluate the inherent annual variability of turbidity within and between watersheds." This is simply not true; we included WY2004 and WY2005 turbidity data in Table 5 and in Figs. 2 and 3. The results were very similar for the two water years, showing greatly elevated turbidities associated with high rates of timber harvest. Also, in an earlier study (Klein, 2003), turbidity data from WY2000-2002 showed the same relationship to harvest rate as Klein and others (2012).

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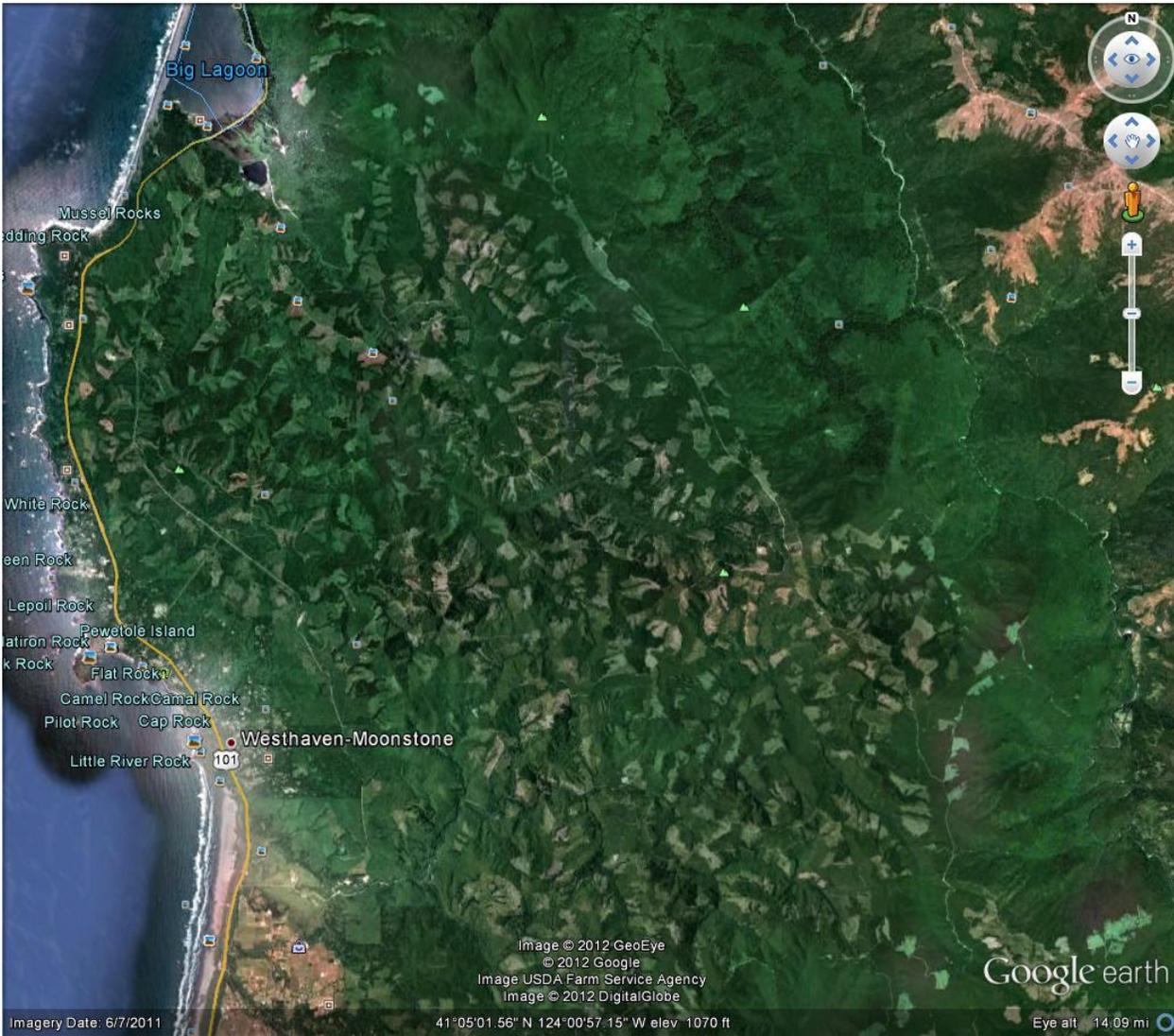


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measures in the Plan were developed for Green Diamond's ownership taking into account existing habitat and watershed conditions and were designed to address the specific activities that Green Diamond employs to conduct its management while minimizing and mitigate the impacts of those activities on aquatic species and their habitats and to protect water quality." This sounds good, but BMPs alone cannot protect water quality if harvest rates are too high. While it would be nice to believe that GRDCs practices are indeed protecting water quality, this has not been demonstrated by the 'Review' or any other data-based analysis. This despite the fact the GDRC has been collecting continuous turbidity and stream discharge data in the Mad River, Little River and Maple Creek for years. If indeed the AHCP is improving conditions for fish despite high harvest rates on their lands, then it would seem beneficial to release those data to verify this. Instead, they chose to keep their data unavailable to the public and scientific community.

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This analysis, in particular, warrants scrutiny because it is one of only a few that actually uses data to support approval of the WWDR. Several issues are addressed point-by-point: 1) the use of stream stage rather than stream discharge is inappropriate because distorts the results compared to the traditional, more valid comparisons with discharge, and the assertion in the 'Review' that stage and discharge are equal is not true. The two variables are not even linearly related, rather discharge is typically an exponential function of stage. 2) the use of slopes and intercepts are similarly inappropriate, being based upon stream stage. 3) the regressions used to support the argument that recent management has not degraded water quality are very weak, with R² values of 0.14, 0.28, 0.56 and 0.54. R² values below 0.50 do not support the argument, and those above 0.50 are fairly weak. 4) the number of data points (eight in Figs. 4 of the 'Review') are too few on which to base an analysis in support of approval of a regulatory document covering so vast a land base and so long a time period. 5) R² values are not the only, nor the best way to evaluate regression results; an analysis of residuals must also be done to

evaluate whether or not linear regression is an appropriate analysis method. 6) if we ignore the weak regression lines in Fig. 4 of the 'Review' and simply look at the data points, the trend is increasing turbidity with increasing harvest rate for the three most recent years shown (2010-2012), in direct contradiction to the main argument in this section of the 'Review'.

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In summary, the 'review' relies almost entirely on verbiage to advocate for approval of the WWDR on GDRC lands, despite the fact that data exist to make a quantitative evaluation. With all the TTS monitoring Green Diamond Resource Company has done, they are in a great position to demonstrate whether or not their watersheds are recovering, or if there is degradation of water quality in areas with high rates of recent harvest.

The 'Review' attempts to discredit the peer-reviewed journal article I recently co-authored (Klein, 2012), despite the fact that the initial study was funded by the Regional Board itself, and does so with misstatements and inappropriate analyses. Through years of turbidity and timber harvest data analyses, the inescapable conclusions are: 1) high rates of timber harvest seriously degrade water quality; 2) watersheds with high harvest are far out of compliance with the North Coast Basin Plan; 3) BMPs alone are not effective enough to prevent cumulative watershed effects; 4) high turbidities in managed basins cannot be explained away as 'legacy effects'; and 5) the single focus on roads in recent years, although greatly reducing water quality effects from logging operations, fails to address the well-documented role of tree removal on sediment delivery to streams. I urge you to defer approval of the WWDR for GRDC lands until reasonable limits on the rate of timber harvest are incorporated.

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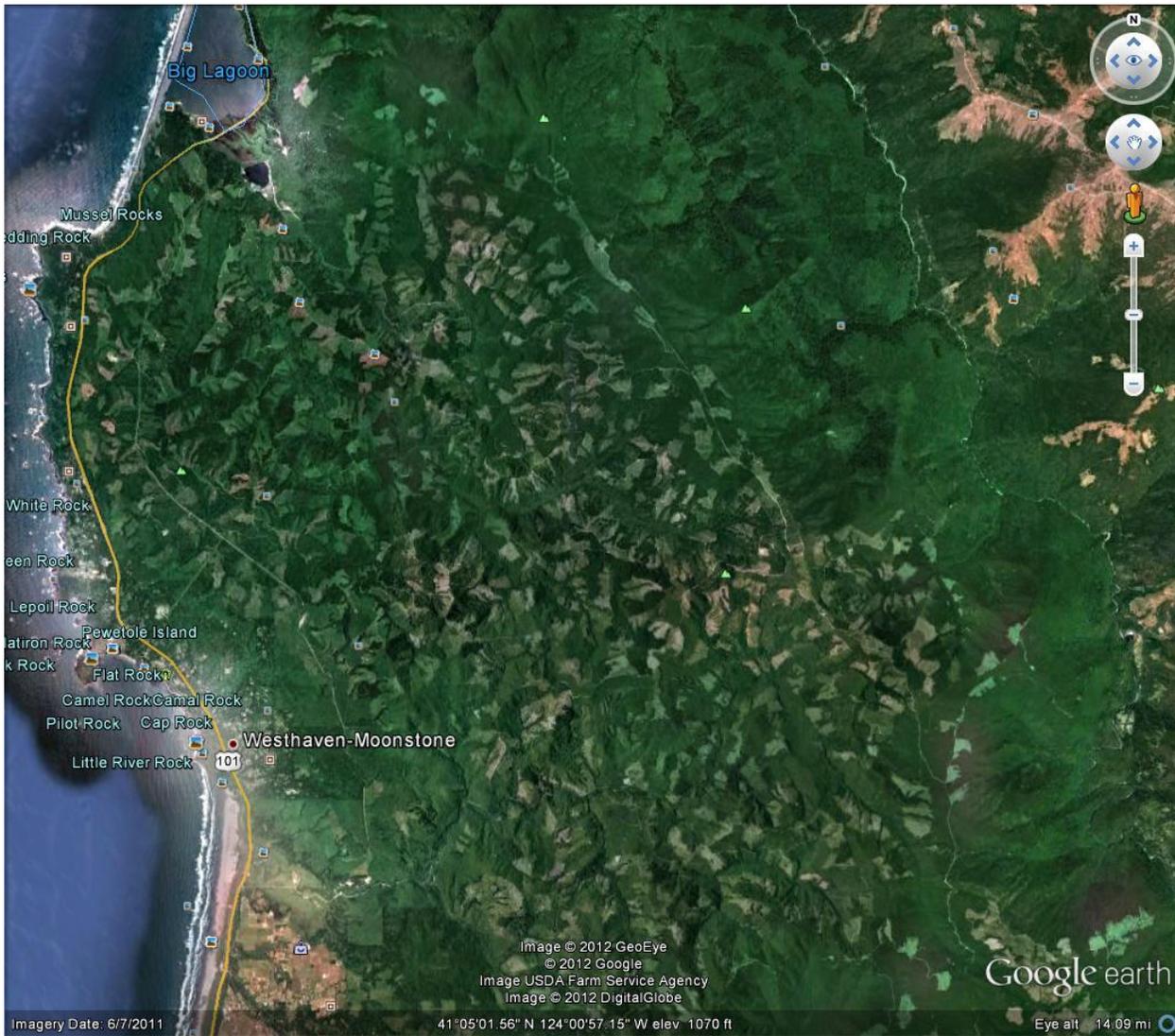


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http://www.fs.fed.us/psw/publications/documents/psw_gtr238/

Reid, L.M., Dewey, N.J., Lisle, T.E., Hilton, S. 2010. The incidence and role of gullies after logging in a coastal redwood forest. *Geomorphology*, v. 117, pp. 155–169.

From: Andrew Orahoske <andrew@wildcalifornia.org>
Sent: Wednesday, September 12, 2012 4:30 PM
To: King, Kaete@Waterboards; St.John, Matt@Waterboards
Subject: Comments on R1-2012-0087 - ROWD
Attachments: Stubblefield et al 2011.pdf; GDRC_WWDR_R Klein comments.pdf

North Coast Regional Water Quality Control Board
c/o Kaete King & Matt St. John
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

RE: R1-2012-0087 – Waste Discharge Requirements for Timber Harvest on Green Diamond Resource Company lands

Dear Responsible Officials,

The Environmental Protection Information Center (EPIC) submits the following comments and attached supporting documentation regarding the document entitled: “Review of Green Diamond Resource Company’s Timber Harvest Operations and Forest Management Activities as they Relate to Rate of Harvest and Cumulative Watershed Effects, June 2012” (hereinafter “Green Diamond Review” or “Review”) that was provided for the proposed order for Green Diamond Resource Company (GDRC) waste discharge requirements (WDRs).

We would like to thank the water board for additional time to review these materials. EPIC disagrees with the water board staff’s assertion in the Green Diamond Review that existing regulatory restrictions on timber harvest are sufficient to meet water quality objectives. See Green Diamond Review at 1-2.

The case study provided in the Review focuses on the Maple Creek watershed. EPIC contends that this watershed is not a good representation of the sediment & temperature impaired watersheds on Green Diamond’s property. This is because the geology in Maple Creek is not as erodible and prone to increased turbidity as other watersheds, such as the entire Mad River. By choosing to focus on Maple Creek and giving a summary of turbidity data from that watershed, the Review cannot credibly support a conclusion that other watersheds have seen similar results.

We incorporate by reference all comments provided to the water board on the Green Diamond Review by Randy Klein and attached to these comments. We would also like to bring to the water board’s attention that turbidity and sediment are not the only concerns with clearcutting and short rotation forestry as practiced by Green Diamond. Also attached, we argue that Stubblefield et al (2012) clearly shows that Green Diamond’s forestry practices reduce the overall summer flow in watersheds because the regenerating stands of densely stocked trees simple use more water than forests that are more complex in structure. This reduction in summer flow is not addresses in the Green Diamond Review. A reduction in summer flow directly impacts water quality, especially temperature at critical times of the year when aquatic species may be at risk due to a combination of high temperatures and low flow.

In conclusion, we urge the water board to reopen the public process and start over on developing the Green Diamond WDR for timber harvest operations. We cannot support the proposed permit because it does not ensure compliance with the Clean Water Act or the Porter-Cologne Act. In the interests of

efficiency, we respectfully request that the water board staff engage with EPIC and other local stakeholders to develop a proposed order that more appropriately addresses the best available science.

Andrew J. Orahoske
Conservation Director

Environmental Protection Information Center
145 G Street, Suite A
Arcata, CA 95521
Office: (707) 822-7711
Mobile: (707) 407-9020
www.wildcalifornia.org

From: Blatt, Fred@Waterboards
Sent: Thursday, September 13, 2012 12:20 PM
To: bill.trush@gmail.com; Randy_Klein@nps.gov; rdklein@sbcglobal.net; Fowler, David@Waterboards; JHENDRIX@dfg.ca.gov; Buffleben, Matthew@Waterboards; Ireid@fs.fed.us; Ireid@fs.fed.us; BVALENTINE@dfg.ca.gov; CBabcock@dfg.ca.gov; JCroteau@dfg.ca.gov; SSniado@dfg.ca.gov; SSTANISH@dfg.ca.gov; jacklewis@suddenlink.net; Joe_Seney@nps.gov; mary_ann_madej@usgs.gov; White, Adona@Waterboards; theferals@suddenlink.net; andrew@wildcalifornia.org
Cc: King, Kaete@Waterboards; St.John, Matt@Waterboards
Subject: Clarification - GDRC Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects

Hello All:

I need to provide a point of clarification for some misinformation that has unfortunately circulated regarding the "GDRC Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects" document.

It has been erroneously reported to many of you that Kaete King, Environmental Scientist with the North Coast Regional Water Quality Control Board, was the author the Green Diamond document referenced above. This is completely untrue.

The referenced document was prepared solely by staff of the Green Diamond Resource Company and submitted as part of a packet of information for their Report of Waste Discharge (ROWD) as required for preparation of Waste Discharge Requirements (WDRs). This document was not written by the Regional Board or our staff and does not represent the position of the Regional Board or its staff.

If you have any questions regarding this clarification, please feel free to contact me.

Thank you,

Fred Blatt
Division Chief
Nonpoint Source and Timber Harvest Division

North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

From: Andrew Orahoske <andrew@wildcalifornia.org>
Sent: Thursday, September 13, 2012 1:35 PM
To: Blatt, Fred@Waterboards; bill.trush@gmail.com; Randy_Klein@nps.gov; rdklein@sbcglobal.net; Fowler, David@Waterboards; JHENDRIX@dfg.ca.gov; Buffleben, Matthew@Waterboards; Ireid@fs.fed.us; Ireid@fs.fed.us; BVALENTINE@dfg.ca.gov; CBabcock@dfg.ca.gov; JCroteau@dfg.ca.gov; SSniado@dfg.ca.gov; SSTANISH@dfg.ca.gov; jacklewis@suddenlink.net; Joe_Seney@nps.gov; mary_ann_madej@usgs.gov; White, Adona@Waterboards; theferals@suddenlink.net
Cc: King, Kaete@Waterboards; St.John, Matt@Waterboards
Subject: RE: Clarification - GDRC Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects

Fred,

The document fails to identify the authors, and the water board failed in identifying the document from the outset, so I am even more confused about this process now than before.

If, as you say, Green Diamond provided this disputed document to the water board as part of “package” of materials, then why haven’t you provided that full package of materials to the public for consideration? Even more baffling is the partial release late in the process, and then more confusion about its origin, only to attempt clarification after the public comment period has closed again. This is absolutely astonishing considering numerous well paid staff are supposedly responsible.

Again, we reiterate our request that this process start over and that the proposed order be pulled from the October meeting agenda. There has been a distinct lack of communication with the public and important stakeholders concerning a permit that will rubber stamp damaging logging practices on roughly 400,000 acres within numerous watersheds impaired by the effects of logging and road-building.

I see only one way forward for water board staff to proceed at this juncture. Start over in the light of day.

Andrew

Andrew J. Orahoske
Conservation Director

Environmental Protection Information Center
145 G Street, Suite A
Arcata, CA 95521
Office: (707) 822-7711
Mobile: (707) 407-9020
www.wildcalifornia.org

From: Blatt, Fred@Waterboards [mailto:Fred.Blatt@waterboards.ca.gov]
Sent: Thursday, September 13, 2012 12:20 PM

To: bill.trush@gmail.com; Randy_Klein@nps.gov; rdklein@sbcglobal.net; Fowler, David@Waterboards; JHENDRIX@dfg.ca.gov; Buffleben, Matthew@Waterboards; Ireid@fs.fed.us; Ireid@fs.fed.us; BVALENTINE@dfg.ca.gov; CBabcock@dfg.ca.gov; JCroteau@dfg.ca.gov; SSniado@dfg.ca.gov; SSTANISH@dfg.ca.gov; jacklewis@suddenlink.net; Joe_Seney@nps.gov; mary_ann_madej@usgs.gov; White, Adona@Waterboards; theferals@suddenlink.net; andrew@wildcalifornia.org
Cc: King, Kaete@Waterboards; St.John, Matt@Waterboards
Subject: Clarification - GDRC Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects

Hello All:

I need to provide a point of clarification for some misinformation that has unfortunately circulated regarding the "GDRC Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects" document.

It has been erroneously reported to many of you that Kaete King, Environmental Scientist with the North Coast Regional Water Quality Control Board, was the author the Green Diamond document referenced above. This is completely untrue.

The referenced document was prepared solely by staff of the Green Diamond Resource Company and submitted as part of a packet of information for their Report of Waste Discharge (ROWD) as required for preparation of Waste Discharge Requirements (WDRs). This document was not written by the Regional Board or our staff and does not represent the position of the Regional Board or its staff.

If you have any questions regarding this clarification, please feel free to contact me.

Thank you,

Fred Blatt
Division Chief
Nonpoint Source and Timber Harvest Division

North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

12September2012

Brief Comments by Dr. William J. Trush:

The recent North Coast RWQCB study, *Review of Green Diamond Resource Company's Timber Harvest Operations and Forest Management Activities as They Relate to Rate of Harvest and Cumulative Watershed Effects* does not warrant concluding that implementation of Green Diamond's management practices, and the current regulatory provisions in place, "avoid, minimize and mitigate potential negative impacts of Green Diamond's operations on the aquatic system and protect, and in some cases improve, water quality." I am not saying that Green Diamond engages in poor forest management practices (given my first-hand experience living in Fieldbrook Valley the last 20 years), but that potential cumulative watershed effects have not been assessed adequately. This remains the greatest threat to salmon/steelhead population recovery and general stream/river ecosystem health in coastal Northern California watersheds.

I agree with Randy Klein's submitted comments regarding the NCRWQCB's June 2012 review. Turbidity has the analytical advantage of being a quick-response, dependent variable for recent, cumulative watershed disturbance. An analysis based on individual annual turbidigraphs with quantitative thresholds could have been a major step taken toward transparency and objectivity. What I found most disappointing, however, was the absence (and it is so glaring that 'avoidance' rather than 'absence' is more appropriate) of any quantitative threshold upon which the turbidity analysis was performed and evaluated. Maintenance of the status quo for listed watersheds is the measure of performance offered/assumed. How can that be an acceptable standard by which a state agency stewards our natural resources? And if turbidity has decreased, as the NCRWQCB review contends, has it decreased enough? Is 'better than it was' (e.g., measured as change in a regression's annual intercept between 2005 and 2012) good enough? Quantitative thresholds as part of a defensible and objective answer, rather than the too-familiar blur of deflecting questions and citing of other public agency agreements/policies, is the agency's responsibility to the public. Could the NCRWQCB authors of this review give us an example of what a hypothetically unacceptable Figure 4 might look like, and outline what actions would have been recommended if that was the actual outcome? I might then be able to decipher what the NCRWQCB considers a significant negative effect and translate that back to individual annual turbidigraphs for an objective cumulative effects analysis. Unfortunately this NCRWQCB review kept the burden-of-proof for cumulative watershed effects squarely on the shoulders of threatened fish and impaired stream ecosystems.

Bill Trush
4598 13th Street
Fieldbrook, CA 95519
Bill.Trush@gmail.com

Dave Feral
Mad River Alliance
134 Esther Lane
Arcata, CA 95521

September 12, 2012

North Coast Regional Water Quality Control Board
David C. Joseph Room
5550 Skylane Blvd., Ste. A
Santa Rosa, CA 95403

RE: August 23, 2012 Meeting, Item # 9:
Waste Discharge Requirements (WDR) for Discharges Related to Green Diamond Resource

Dear Regional Board Members:

I want to thank you and your staff for extending the public comment period from September 3, 2012 to September 12, 2012, allowing more time for the public to review the document "*Review of Green Diamond Resource Company's Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects*" (June 2012) (hereafter "Green Diamond Review of Operations Paper").

This seven business day extension notwithstanding, I would like to respectfully point out the timeline of events as they unfolded in my perspective in regard to the aforementioned document ("I"). Second, I will make comments regarding the Green Diamond Review of Operations Paper ("II").

I.

On Monday, April 23rd, 2012, I sent to NCRWQCB Staffer Ms. Kaete King an e-mail regarding Green Diamond's Forest Waste Discharge Requirements (FWDR), reprinted below:

Dear Ms. King,

I am a landowner on the Mad River near Blue Lake Ca. I'm very interested in learning more regarding the Waste Discharge Permit process. I have a lot to learn. I understand that there is a meeting on June 7th in Willow Creek to examine Green Diamonds WDR for their entire ownership. Unfortunately I will not be able to make it to the June meeting in Willow Creek due to prior engagement, however I may have a friend that can attend. *In any case I would like to be informed about the state and timeline for the GD ownership wide WDR. Can you please keep me in the loop?*

Cheers!,
Dave Feral
Blue Lake, CA
707.822.2514

On Tuesday April 24 I held a phone conversation with Ms. King regarding the process of Green Diamond filing a FWDR within the Mad River Watershed and the potential relationship harvest may have upon sediment delivery to the tributaries and mainstem of the Mad River. During the course of our conversation it became apparent to me that Ms. King was unaware of a recent peer review publication that had recently been published in the publication *Geomorphology* by Klein, et al., entitled: *Logging and turbidity in the coastal watersheds of northern California. (2012)*

Below is a copy of the e-mail I sent Ms. King on 24th 2012 indicating my interest and exactly where to read to get the information I was trying to convey to her in our phone conversation regarding timber harvest and potential landslides related to harvest. Klein, et al. (2012) was attached to that e-mail, reprinted below:

Original Message -----

Subject:Mad River

Date:Tue, 24 Apr 2012 10:53:04 -0700

From:theferals <theferals@suddenlink.net>

To:kking@waterboards.ca.gov

Hi Kaete,

Thank you for getting back to me regarding my questions, sorry to rush off the phone like that, and I hope we can continue our discussion regarding sediment in the Mad River. I have attached the paper I was referring to during our conversation, if you take a look at the discussion section 5 page 143 the left hand column explains more clearly what I was trying to explain. I look forward to learning more about this as the process unfolds, please send me any articles you think will help me understand the processes involved in sediment delivery to the system., and any updates on this as you can

Thanks again for your help on this

Dave Feral
Mad River
707.834.3623

Please note from my conversation with Kaete on April 24th is seemed apparent that she had yet not read the paper by Klein, et al. (2012).

In my e-mail (dated April 24) please note, I ask: “*please send me any articles you think will help me understand the processes involved in sediment delivery to the system, and any updates on this as you can*” (this is in reference to the phone conversation and my e-mail on April 23).

It is now my understanding that the Green Diamond Review of Operations Paper was worked on and substantially completed between April 24th and June 2012 by Ms. King and possibly others.

In the letter most recently sent to me (dated: September 5, 2012) by board staff Executive Officer Matthias St. John, it was explained:

*In your letter, you requested an additional 30 days of public comment in order to review a document that was posted on the Regional Water Board website after the public workshop on August 23, 2012. This document is part of the Report of Waste Discharge provided by Green Diamond in its application for Waste Discharge Requirements. **Documents supporting the development of the Green Diamond Forest Management WDR have always been available upon request.** There is no legal requirement to publish all materials on the Regional Water Board website, and this particular document was provided and posted in response to a member of the public who spoke at the August 23 workshop. As a courtesy and upon your request and the request of another member of the public, the Regional Water Board will allow an additional seven (7) days for limited review of the documents associated only with the Report of Waste Discharge, with a new close of public comment date of 5:00 p.m. on September 12, 2012. Again, additional comments are limited only to the Report of Waste Discharge. The documents associated with the Report of Waste Discharge are:*

- Project Description
- Covered Activities Matrix
- Review of Green Diamond Resource Company's Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects

I want to point out in the letter it states: “[d]ocuments supporting the development of the Green Diamond Forest Management WDR have always been available upon request.”

And, in my e-mail (dated April 24) I state this: : “*please send me any articles you think will help me understand the processes involved in sediment delivery to the system, and any updates on this as you can.*”

Given that my e-mail on April 23rd and my phone conversation with Ms. King on **April 24, 2012**, was in regards to the Green Diamond FWDR, then you may understand my

dismay when a document prepared and substantially completed by her by June, 2012 was not made available to me until after I had made a presentation to the North Coast Regional Water Quality Control Board roughly three months later on August 23, 2012. The clear intention of my e-mail on April 24th was that Ms. King should please send me any relevant papers or updates regarding **“the processes involved in sediment delivery to the [Mad River] system.”** The implication of that clear request was **to receive all and any information relating to findings or research having the potential to impact policymaking regulating sediment delivery to the Mad River Watershed.** It is clear that the Green Diamond Review of Operations Paper relates directly to that topic, or to borrow a legal term, was “on point.” Accordingly, this Paper was unknown to me until a very short number of days before the scheduled close of the Public Comment Period. While the extension of Public Comment Period by seven business days helps to mitigate this fact I would like to avoid problems like this in the future. Please let me know what the procedures are and how to best communicate with staff in order to work together more effectively.

II.

In the Second half of this letter I will address the document entitled: “Review of Green Diamond Resource Company’s Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects” (June 2012). My comments are in **blue, the review paper is in green:**

Section I. Forest Management Effects on the Aquatic System and Green Diamond’s Conservation Strategies to Minimize, Mitigate or Avoid Impacts on Water Quality and Aquatic Species through Section (1) Road Management Measures

This describes in theory how management practices Green Diamond Resource Company employs are supposed to offset negative anthropogenic effects in the Watershed. There does seem to be excessive conjecture here with many claims that have yet to be substantiated. These conjectural claims include:

“The AHCP’s harvest-related ground disturbance measures reduce the impacts of any operations related to altered hydrology by minimizing soil compaction which can increase the magnitude of peak flows and the volume of sediment available for runoff during such events.” (Pg. 9) **and** “Collectively these riparian and slope stability measures provide root strength to mitigate management related sediment inputs associated with stream bank instabilities.” (Pg. 13).

Though these claims are persuasive, there is no evidence in this paper that supports these claims.

First, the study of Maple Creek does not use *clearcut equivalent* area, so the harvest rates compared with turbidity are artificially high, making it appear that higher harvest rates don't result in much of a turbidity increase. Second, the 1-year lag of harvesting versus turbidity data doesn't even come close to capturing the 'effects' period (minimum of 15

years after harvest). Finally, the data points plotted in Fig 4 are poorly represented by the regression lines - there is actually an uptick in 2011-2012 in the y-intercept for the relationship between stream stage (their surrogate for discharge) and turbidity.

On page 21 in the **Riparian Management Measures** it is stated:

“There is an immediate net reduction of canopy cover of approximately 15-20% following timber harvest in the outer zone, which will be replaced within 5-10 years by recovery of the remaining tree crowns. *As a result, there should be little or no measurable change in water temperature as a result of canopy reduction following timber harvest.*”

Shouldn't it be management's goal to improve the situation, not simply keep temperatures the same? Aren't these waters *already* temperature-impaired?

On page 31 it states: “the establishment of equipment exclusion zones on watercourses that do not support aquatic life (Class III).”

This is just not the case. I suggest a study of the Hyporheic Zone:

***Dicamptodon tenebrosus* Larvae Within Hyporheic Zones of Intermittent Streams (Class III stream) in California** Feral et. al. *Herpetological Review*, 2005, 36(1), 26–27.

“We found individual larval *D. tenebrosus* in 22 samples. Fifteen larvae were captured in the 0 to -30 cm traps and seven in the -30 to -60 cm traps. Larvae ranged from 39–83 mm total length (mean \pm SE = 55.2 \pm 2.6 mm). Similar numbers of salamanders were captured in each tributary, and captures occurred throughout the year and did not appear to vary with season. *D. tenebrosus* were captured in all three stream locations, although more were captured at the lower sites (9) than in the middle (7) or upper (6) sites. All *D. tenebrosus* captures occurred when surface flow was < 4 cm deep, and the majority of captures (18 of 22) occurred when there was no surface flow. “

MacDonald, et al. (2004) found that erosion rates from roads can be one or more orders of magnitude higher than erosion rates from skid trials and non-compacted areas in harvest units.

This study is done in the Sierra Mountain Range, not a good comparison to the geology of the Mad River Watershed.

Although roads have been shown to play a significant role in affecting water quality, Klein, et al. (2012) found that roads did not significantly influence observed turbidity levels in managed watersheds.

This is a mischaracterization of Klein, et al. (2012) study results. A clear way to explain this is to actually quote the author:

“Regression analyses of turbidity on watershed natural physiographic characteristics and land use histories (logging and roads) showed the rate of recent logging (mean annual percent of watershed area) explained the greatest amount of variability in turbidity at the 10% exceedence level. Drainage area was also significant but was secondary to harvest rate. None of the other watershed variables was found to improve the regression models. Despite much improved best management practices, contemporary timber harvest can trigger serious cumulative watershed effects when too much of a watershed is harvested over too short a time period.”

The above quote is taken from the abstract. If one reads beyond this, one finds that Klein, et al. (2012) acknowledges the role roads play in sediment delivery:

“Because they intersect frequently on the landscape, logging road stream crossings are *perhaps the most prominent sources of delivery of sediment to streams*. Erosion from within cut units is less likely to reach a stream, depending on site topographic and hydrologic attributes and the effectiveness of streamside buffers. Although buffers are a commonly applied BMP that limit the occurrences or volumes of sediment from reaching a channel, instances of ‘break-through’ (hillslope-eroded sediment passing through a buffer) can occur nonetheless, as we have observed in the field. Rivenbark and Jackson (2004) documented one breakthrough occurrence for about every 8 ha of clearcut forestlands in the southeastern U.S., with 14% of the 187 breakthroughs inventoried traveling >30 m before reaching a stream channel.” (emphasis added)

Klein et. al. also explain:

“Contrary to our expectations, some research results (Anderson, 1970, 1975, 1979; Reid and Dunne, 1984), and conventional wisdom, road variables added little statistical value beyond harvest rate and drainage area in explaining turbidity variations, possibly resulting from incomplete and/or inaccurate road data. For example, road lengths are probably underrepresented in ‘off-the-shelf’ data sets used here. Perhaps more accurate road data would have elevated the importance of road variables in explaining turbidity. But roads were indirectly accounted for in that they are closely linked to harvest rate: the density of the road network and the intensity of road use typically rise with increasing harvest rate. The correlations in the full data set were $r=0.80$ ($n=28$, $p<0.001$) between 15-year mean annual harvest rate and basin-wide road density and were $r=0.70$ ($n=28$, $p<0.001$) between mean annual harvest rate and non-paved road construction in the 15 years prior to the turbidity data period (WY2005).”

It is agreed that roads are a contributing factor, however Klein, et al. (2012) found harvest rate and type to have much higher correlation to sediment being delivered to streams in this study.

1. Their Klein, et al. (2012) analysis included only a single year of turbidity data (WY 2005) so they were not able to evaluate the inherent annual variability of turbidity within and between watersheds.

Table 5 and figure 2 in Klein et. al. both clearly shows the use of water years 2004 and 2005.

Also Klein et. al.: “Data for the 2003, 2004, and 2005 winter runoff seasons (WY2003, 2004, and 2005) were assembled and prepared for analysis.”(page137)

And, Klein et. al. state:

“The permutation test was selected because it is an exact, easily interpretable, nonparametric test suitable for small sample sizes, and it can be used with unbalanced repeated measures designs. The data are unbalanced because three more sites were available in 2005 (n=27) than in 2004 (n=24). And the 2004 and 2005 measurements of 10% TU for a given station are highly correlated ($r=0.96$), so they must be treated as repeated measures. For this permutation test, the group labels for any two groups being compared are reassigned to the paired (2004, 2005) turbidity values, in every possible permutation, and the 2004 and 2005 differences in mean 10% TU between the two groups are computed for each permutation. The proportion of permutations for which both the 2004 and 2005 differences equal or exceed the differences observed in the actual sample is interpreted as the probability of the observed result having occurred if group identity were unrelated to 10% TU. A small probability indicates that there is a significant relation between harvest rate and turbidity.”

Klein et al. (2012) also assert that there are no regulations in place to control rates of harvest. This statement is simply not true in California. As described above there are several provisions in the CFPRs that control the timing, location and intensity of timber harvest (See 14 CCR 913.1(a)(1), (a)(3), and (4)(a)).

It is significant to note that the riparian protections that Green Diamond suggests being restrictive are not as strict as the 2010 ASP rules passed by CalFire which apply to everyone who doesn't have an AHCP. Green Diamond also claim that the forest practice rules have provisions which control the rate of harvest, but this is only true indirectly. There is nothing in the current CFP rules which directly addresses rate of harvest. There are adjacency requirements and practical limitations which may prevent a Timber Harvest Plan from cutting even faster than Green Diamond already does, but nothing that says X% of the watershed must be in stands > 50 yrs old, for example.

Given the disparity of opinion on this I suggest we work toward a reasonable solution to this matter. **As is I suggested in my last letter and presentation on August 23rd, an annual rate of harvest of < 1.5 % selective cut is recommended to reduce the cumulative ill effects for salmonids living in the Mad River Watershed.** In addition to this, **the Mad River Alliance also formally requests that all sediment monitoring data be available for public comment on an ongoing basis and all analysis be completed by a reputable third party.**

Please also consider this letter a formal request to receive all future data, reports and documentation prepared for, which relate to, or which could impact policymaking in regard to sediment delivery rates and waste discharge rates of timber harvesting operations taking place in the Mad River Watershed.

Sincerely,

Dave Feral
Mad River Alliance
134 Esther Lane
Arcata, CA 95521

Mission

The Mad River Alliance works to protect clean water and the biological integrity of the Mad River watershed for the benefit of its human and natural communities.

From: St.John, Matt@Waterboards
Sent: Wednesday, September 12, 2012 10:46 AM
To: King, Kaete@Waterboards; Blatt, Fred@Waterboards; Olson, Samantha@Waterboards
Subject: Fwd: GDRC Timber Harvest Operations and Forest Management Activities As TheyRelate to Rate of Harvest and Cumulative Watershed Effects

Sent from my iPhone

Begin forwarded message:

From: <Randy_Klein@nps.gov>
Date: September 12, 2012 6:39:04 AM PDT
To: "Reid, Leslie -FS" <lreid@fs.fed.us>
Cc: Jon Hendrix <JHENDRIX@dfg.ca.gov>, "Randy_Klein@nps.gov" <Randy_Klein@nps.gov>, Brad Valentine <BVALENTINE@dfg.ca.gov>, Curt Babcock <CBabcock@dfg.ca.gov>, "JCroteau@dfg.ca.gov" <JCroteau@dfg.ca.gov>, "Susan Sniado" <SSniado@dfg.ca.gov>, Stacy Stanish <SSTANISH@dfg.ca.gov>, <muffleben@waterboards.ca.gov>, <mary_ann_madej@usgs.gov>, <Matt.St.John@waterboards.ca.gov>, <bill.trush@gmail.com>, <awhite@waterboards.ca.gov>, <Joe_Seney@nps.gov>
Subject: RE: GDRC Timber Harvest Operations and Forest Management Activities As TheyRelate to Rate of Harvest and Cumulative Watershed Effects

Leslie, thanks for clarifying that issue. There was much more in Ms. King's 66-page report than I could hope to address in the extremely short time between when the report became available to the public (several days ago) and the deadline for comments (today at 5 pm).

Randy D. Klein, Hydrologist
Redwood National and State Parks
1655 Heindon Road
Arcata, CA 95521
(707) 825-5111
["Randy_Klein@nps.gov"](mailto:Randy_Klein@nps.gov)

-----"Reid, Leslie -FS" <lreid@fs.fed.us> wrote: -----

To: Jon Hendrix <JHENDRIX@dfg.ca.gov>, "Randy_Klein@nps.gov"

<Randy_Klein@nps.gov>

From: "Reid, Leslie -FS" <lreid@fs.fed.us>

Date: 09/11/2012 02:48PM

cc: Brad Valentine <BVALENTINE@dfg.ca.gov>, Curt Babcock
<CBabcock@dfg.ca.gov>, "JCroteau@dfg.ca.gov" <JCroteau@dfg.ca.gov>,
Susan

Sniado <SSniado@dfg.ca.gov>, Stacy Stanish <SSTANISH@dfg.ca.gov>

Subject: RE: GDRC Timber Harvest Operations and Forest Management
Activities As They Relate to Rate of Harvest and Cumulative Watershed
Effects

Hi, Jon -- Wow. Those statements regarding paired watershed studies are the equivalent of an assertion that "you no longer need to believe in gravity because Newton used an old-fashioned apple." Paired watershed studies are powerful in part because they allow certain variables to be controlled for, and this facilitates better understanding of the underlying causes of observable treatment effects. That understanding can then be applied to help understand the effects of other types of treatments. To the extent that other treatments influence the variables controlling responses in similar ways, those responses will be similar.

In the case of Caspar Creek, for example, the paired-basin studies documented the magnitude of the influences of particular timber operations on hydrologic and sediment response, and the studies also provided the information needed to understand why those effects came about. The hydrological changes were due largely to the reduction in canopy after logging (i.e., not to roads or compaction), and comparison of results for 1970s tractor-yarded selection cuts vs. 1990s cable-yarded clearcuts show similar patterns for peakflow change, with moderate differences in magnitudes.

In particular, the observed peakflow changes for the clearcutting are predictable on the basis of measurements of changes in rainfall interception and estimates of transpiration changes after logging. In other words, it doesn't matter what practices were used to clearcut and yard the trees, since it's the absence of the trees that generated the effect.

Helicopter logging would generate about the same kind of peakflow response as ox-team-logging would if the same area was clearcut.

--Leslie

-----Original Message-----

From: Jon Hendrix [mailto:JHENDRIX@dfg.ca.gov]

Sent: Tuesday, September 11, 2012 1:57 PM

To: Reid, Leslie -FS; Randy_Klein@nps.gov

Cc: Brad Valentine; Curt Babcock; JCroteau@dfg.ca.gov; Susan Sniado; Stacy Stanish

Subject: Re: GDRC Timber Harvest Operations and Forest Management Activities As They Relate to Rate of Harvest and Cumulative Watershed Effects

Randy,

Thank you for your comments. You answered most of my questions pertaining to your paper(s) and statistical analyses.

I'm wondering if you and/or Leslie would address the report's assertions (copied below) about paired watershed studies.

In referencing these studies in our comments, DFG provides the usual caveats of older practices vs. newer ones. But to say their use is inappropriate is like saying paleontologists should ignore the fossil record. As you state, we don't get data from the project proponent, which leaves us with utilizing research from our research forests. I find these comments dismissive at best and ignore paired watershed study findings that investigated a wide array of operations (i.e., in Caspar) that included old methods and experimented with improved methods such as not burring and buffering headwater streams in clearcuts.

"Given the substantial changes in every aspect of contemporary forest management, attempting to draw inferences from paired watershed studies that included substantial areas of historical logging is clearly inappropriate." (page 30)

and

"Historical paired watershed studies were extremely valuable in understanding the fundamental effects of timber harvest on water quality, water quantity and watershed processes and were instrumental in guiding the development of current forest practices and protections to avoid, minimize and mitigate forest management impacts. However the use of these studies to evaluate the effects of present day forest practices on aquatic resources is inappropriate." (page 32)

Again, Thanks,

Jon Hendrix
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California Department of Fish and Game
Coastal Timberland Planning
Northern Region
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<Randy_Klein@nps.gov> 9/11/2012 11:05 AM
>>>

All, here are my comments on the referenced document by Ms. King.

Randy D. Klein, Hydrologist
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1655 Heindon Road
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(707) 825-5111
["Randy_Klein@nps.gov"](mailto:Randy_Klein@nps.gov)

-----"Fowler, David@Waterboards" <David.Fowler@waterboards.ca.gov>
wrote:

To: "Randy_Klein@nps.gov" <Randy_Klein@nps.gov>, Jon Hendrix
<JHENDRIX@dfg.ca.gov>, "Buffleben, Matthew@Waterboards"
<Matthew.Buffleben@waterboards.ca.gov>
From: "Fowler, David@Waterboards" <David.Fowler@waterboards.ca.gov>
Date: 09/10/2012 07:46AM
cc: "lreid@fs.fed.us" <lreid@fs.fed.us>, Brad Valentine
<BVALENTINE@dfg.ca.gov>, Curt Babcock <CBabcock@dfg.ca.gov>, Joe
Croteau
<JCroteau@dfg.ca.gov>, Susan Sniado <SSniado@dfg.ca.gov>, Stacy Stanish
<SSTANISH@dfg.ca.gov>, "jacklewis@suddenlink.net"
<jacklewis@suddenlink.net>
Subject: Re: GDRC Timber Harvest Operations and Forest Management
Activities As They Relate to Rate of Harvest and Cumulative Watershed
Effects

I believe the primary author is Kaete King.

David Fowler
North Coast Regional Water Quality Control Board

5550 Skylane Blvd., Ste. A
Santa Rosa, CA 95403
David.fowler@waterboards.ca.gov
707-576-2756

On 9/5/12 4:28 PM, "Randy_Klein@nps.gov" <Randy_Klein@nps.gov> wrote:

Hi Jon,

I have taken a brief look at this document and have some initial thoughts

I

will forward to you soon. For now, there are some statements that are

quite

simply wrong in there regarding what was in the paper I co-authored

with

Jack Lewis and Matt Buffleben (cc'd on this) this past January.

I was surprised to see no author attributed to the document; any idea

who

wrote it?

Randy D. Klein, Hydrologist
Redwood National and State Parks
1655 Heindon Road
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(707) 825-5111
["Randy_Klein@nps.gov"](mailto:Randy_Klein@nps.gov)

-----Jon Hendrix <JHENDRIX@dfg.ca.gov> wrote: -----

To: <lreid@fs.fed.us>, <Randy_Klein@nps.gov>

From: Jon Hendrix <JHENDRIX@dfg.ca.gov>

Date: 09/05/2012 04:03PM

cc: Brad Valentine <BVALENTINE@dfg.ca.gov>, Curt Babcock
<CBabcock@dfg.ca.gov>, Joe Croteau <JCroteau@dfg.ca.gov>,
Susan

Sniado

<SSniado@dfg.ca.gov>, Stacy Stanish <SSTANISH@dfg.ca.gov>, David
Fowler

<DFowler@waterboards.ca.gov>

Subject: GDRC Timber Harvest Operations and Forest
Management

Activities

As

They Relate to Rate of Harvest and Cumulative Watershed Effects

Randy and/or Leslie,

I'm curious if you've reviewed and/or have comments on the,
"Review

of

Green Diamond Resource Company's Timber Harvest Operations and Forest
Management Activities As They Relate to Rate of Harvest and

Cumulative

Watershed Effects June 2012".

Found at:

http://www.waterboards.ca.gov/northcoast/board_decisions/tentative_orders/

It's on the NCRWQCB's list of items for their October 4, 2012 board meeting.

I can't tell who authored it, but, it makes several curious assumptions

- including some about comparing current management to 'historical' paired watershed studies, rate of harvest and turbidity, current management effects on legacy (sediment) impacts, Klein et al. 2012, etc.

DFG timber review staff have waded into the ROH/BMP/turbidity and sediment 'waters' recently. We've relied upon the work of Randy and others and the Caspar Creek Study watershed findings. So we're interested in learning what others knowledgeable in forest hydrology might have to share regarding this report, its assumptions, findings, etc.

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(See attached file: GDRC_WWDR_R Klein comments.pdf)

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