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Affiliate of Redwood Coast Watersheds Alliance

Chair Felicia Marcus and Board Members
c/o Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
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Sent via electronic mail to: commentletters@waterboards.ca.gov,

Comment – Elk River TMDL (Action Plan) and Basin Plan Amendment.

Coast Action Group has, historically, been involved in TMDL development and implementation in California, primarily focused on north coast rivers, since the very beginning (1995). CAG has worked on, commented on, and helped with the development of, State and Regional Board Policy and Program development – TMDLs, Impaired Listing Policy, Timber Harvest WDRs, Enforcement Policy, NPDES and Stormwater issues, Etc.. Additionally, we have reviewed and commented on over 150 Timber Harvest Plan approval processes and reviewed the entire file of over 800 Timber Harvest Plans. CAG is active in the management of timber lands owned by the Conservation Fund – 74,000 acres in the Garcia River, Gualala River, Big River, and Salmon Creek watersheds (Mendocino County). CAG has sufficient history and background in these processes to make well grounded comments.

We have historically had great confidence in the use of TMDLs to address and remedy issues on our impaired listed water resources. CAG agrees with the use of Implementing Programs and non-regulatory actions as sources of remedy in these cases of impairment. However, CAG notes that these programs, TMDLs and related Action Plans – as applied, must have reasonable potential to attain the desired outcomes. In the case of the recently accomplished State TMDLs and related Action Plans on impaired north coast rivers we have noticed misuse of the authority and potential of TMDLs and related Action Plans (Implementing Programs). Additionally, we notice a failure of these plans to be consistent with State Water Code and Resources Code (CEQA). In part, this is the basis of our argument for providing comments that were not initially made at the point of the Regional Board approval of the Elk River TMDL Action Plan.

The development of a TMDL (in this case the Elk River TMDL Action Plan) is dependent on the Technical Analysis and the Initial Study. Under State Water Code, a State TMDL is a Water Quality Control Plan that must contain the regulatory language necessary to attain Water Quality Objectives/Water Quality Standards. In the case of the Elk River TMDL Action Plan WDRs were

(are) indicated as part of the implementing structure (Phase I) of the TMDL. At the time of approval of the Elk River TMDL Action Plan the implementation phase WDRs were not. developed or described. (Actually the Regional Board fully intended to connect the TMDL and WDR approval process – however that did not come to pass). We had been in contact with Board Staff in regards to both products (TMDL Action Plan and WDR) and were in agreement with the product (as indicated by the Technical Analysis, Initial Study, and proposed WDR constraints/language). We saw no need to comment, as we were assuming the Board would approve the final product – and be consistent with all legal requirements as well as the Technical Analysis and Initial Study. However, that did not occur.

With the separation of the processes (approval of the TMDL Action Plan and WDR separately), and with outcomes (insufficient WDRs = inconsistent with the Technical Analysis and TMDL Action Plan targets) the Regional Board failed to see what was pointed to as requirements in the Technical Analysis, Initial Study, and (also) the TMDL Action Plan. The Board made procedural error and acted outside the law in the approval process – by: 1) segmenting the aspects of the project – TMDL Action Plan from the implementing aspects of the project (where the action resides in Implementing Programs/projects to later be described and approved): 2) by not being consistent with the actions necessary for attainment of Water Quality Standards – as indicated by the supporting documents (Technical Analysis and Initial Study). Either the Regional Board did not fully describe the project (TMDL Action Plan – including all actions as part of the Action Plan), or the project was segmented – allowing different aspects of the project to be considered separately – thus depriving the public or other agency information needed in the informed decision making process.

In this case, where the Regional Board fails to comply with basic California Code, Cal Water Code, and CEQA , we feel that it is our obligation and right to comment on that fact while the process is before the State Board.

The fundamental problem with the process the Board engaged in, segmenting the TMDL Action Plan from the necessary actions to attain Water Quality Objectives (WQS) in the WDR and other non-regulatory actions, there is no way for the public or other interested parties to assess and make determination of the potential effectiveness or capability of the TMDL Action Plan to attain the desired results. (This is supported by subsequent Petitions/challenges to the HRC WDR – on process issues and inconsistency with the Technical Analysis). Furthermore, the TMDL Action Plan (alone) is not consistent with Cal Water Code – as the TMDL Action Plan fails to describe all actions necessary to attain WQS.

Additionally, because of these issues and failures, we feel that whole concept and potential of TMDLs and Action Plans are in danger of failure (or have failed). Thus, we ask the State Board to consider our presentation, as Comments to the above noted action, and make adjustments to, both, bring the TMDL approval process into compliance with State Code and keep TMDLs as viable and necessary tools capable of moving impaired waterbodies towards positive outcomes - attainment of Water Quality Standards.

Appurtenant, to the basic comments in this letter (and attached) are pertinent segments of the Elk River Technical Analysis text (which must be understood to make valid decision) with inserted

comment by CAG – **which is in Bold Underlined**. The Technical Analysis is the basis of the TMDL and attainment strategy – including Implementing Programs/WDR and non-regulatory actions. A significant part of our comment is how the Technical Analysis, Initial Study, and TMDL pointed to the need for specific (stringent) actions (Phase I Recovery Actions) that are currently not part of the approved TMDL Action Plan or currently approved WDR (now being challenged as insufficient by Petition to the Board). And, without those specific (stringent) actions, on which the other phases of non-regulatory recovery actions are dependent on the success of Phase I actions, the subsequent actions will not be successful. Here lies another CEQA based problem – that many of the Phase II actions have not been developed or described and there is no reasonable assurance that they will actually take place or be employed..

ACTION PLAN FOR THE UPPER ELK RIVER SEDIMENT TMDL

As stated, above, CAG finds that the analysis and findings in the Elk River Technical Analysis, Initial Study, and the TMDL Action Plan are based on are good and sufficient data and science. However, Action Plan attached to the title of the TMDL document is a misnomer. The Action Plan resides in the use of Implementing Programs (WDR, Waiver, COA, etc.) and other non-regulatory actions, monitoring, and restoration efforts – where there is a lack of description on these phased actions (products) – as part of the project – which is a Water Quality Control Plan.

It is unclear as to what a phased TMDL is. Is it a phased implementation of actions necessary to attain WQS, or is it a phased reduction of pollutant loading? If it is the latter, then it is inconsistent with the finding that the impaired reaches of the Elk River that are severely impaired, with a finding of ZERO assimilative capacity – and where no further loading of pollutants is permissible. The TMDL accurately describes the problem – issues related to anthropogenic production of sediment from land use (timber operations) that are totally overwhelming the hydrology of the lower Elk River. The anthropogenic loading (from the Tech Analysis) shows loading to be 3 to 5 times the natural background level.

The TMDL Action Plan (Based on the Tech Analysis) provides Water Quality Indicators that point to actions necessary to control anthropogenic sources (from timber harvest and related activity) - where specific controls for the protection of water courses – Class I, II, and Class III water courses are called for (Table 2).

" Because capacity for sediment is limited by the ongoing aggradation in the impacted reaches, the loading capacity for additional sediment is defined as zero until the capacity of the impacted reaches can be expanded"

"The zero load allocation does not constitute an effluent limitation or a waste load allocation, and the Board has discretion on how to implement it in WDRs, waivers or other actions to reduce and eliminate waste discharges. Once the loading capacity has been expanded, the Regional Water Board can reevaluate the load allocation and establish a second phase of the TMDL, as appropriate."

However, the necessary stringent controls are indicated - but do not appear in the proposed WDR language. These controls were to be part of the Phase I effort to decrease loading. Other non-regulatory efforts are noted in the TMDL (where those actions have not been described – and – there is no assurance that these actions will actually be implemented). These proposed non-regulatory actions (as later phases) are dependent on the success of the proposed Phase I ac-

tions (proposed in the original WDR language and Initial Study and were later limited during the approval process).

"Implementation of phase 1 requires control of all existing and potential future sediment sources in the upper watershed while the Elk River Recovery Assessment is completed and the Elk River Watershed Stewardship Program is developed, initiated, and successfully results in the activities necessary to expand the sediment loading capacity of the impacted reaches and abate nuisance conditions. The Regional Water Board can recalculate, as appropriate, the sediment TMDL following remediation and restoration of the impacted reaches, by assessing the expanded capacity of the watershed to transport sediment and water more normally."

Here (above) the TMDL Action Plan considers WDRs as an essential mechanism for the control of sediment in this case. The TMDL Action Plan relies on WDRs (as the initial and principal pollution control tool) to be developed for all the landowners – including HRC, Green Diamond, and other smaller landowners, with subsequent reliance on other assessment and non-regulatory recovery plans – and – with monitoring and adaptive management programs (not yet described).

LEGAL FRAMEWORK – DISCUSSION

The Initial Study, TMDL Action Plan, and WDR, all supported by the Tech Analysis is one project in its entirety. No one piece of this project can stand alone (except -maybe the Tech Analysis as the foundation the foundation as an independent scientific review) and attain any desired outcomes. Considering and approving the TMDL (TMDL Action Plan) alone - is itself a violation of CEQA. Explanation:

Take any Technical TMDL (we can use Elk River, or the Gualala River): a technical analysis is completed to consider the setting, history of land use, hydrology, geology, weather, etc., included is an analysis of pollutant production (sediment) attributed to specific sources , natural vs. anthropogenic. The technical aspect of the TMDL determines the loading and loading allocations and the amount the LAs (as controllable sources) must be reduced to meet Water Quality Standards - over time. The Elk River Tech Analysis did this and pointed directly at what must be accomplished to control sources from land use - and the Initial Study for the TMDL Action Plan and WDR agreed and set forth specific standards for the control of sediment from timber operations. The Tech Study also found ZERO assimilative capacity. That means the system can not take any more pollutants and recover. (timber harvest). Furthermore, the weakening of the land use controls makes recovery (in any reasonable period of time) very unlikely or impossible. First, the weakening of the land use controls for timber operations (as stream protections and rate of cut controls over a wider area of the upper watershed) is in direct defiance of what is called for in the Tech Analysis, Second, and very important; the other strategies for recovery (restoration processes - yet to be defined) rely on the stringent controls (Phase I) pointed to by the Tech Report, Initial Study, and approved TMDL. And, the later phase actions rely on the success of the more stringent (Phase I) land use controls.

Cal Water Code and Water Quality Control Plans.

Under Cal Water Code - a TMDL, as a Water Quality Control Plan, can not be adopted just as a technical document pointing to necessary reductions of pollutant inputs. State Code requires an Action Plan. And - the action part of a Water Quality Control Plan must describe all actions necessary to attain WQS, have a schedule for implementation, and monitoring in place to assure

progress is occurring and the action plan is working. In this case the Action Plan is the WDR (which should not be approved as a separate aspect of the project). A TMDL can not be approved without the necessary Action Plan (with the included description of actions necessary to attain WQS). The Action Plan is part of the project and must be described and reviewed under the auspices of CEQA and comply with Cal Water Code.

Approving parts of a specific Water Quality Control Plan separately is a violation of CEQA. In this case, the fact that the WDR is deficient and inconsistent with the Tech Analysis, Initial Study, and the Basin Plan - anti-deg language supports our argument.

Given inconsistencies with the legal framework and issues raised in the supporting documents, the TMDL Action Plan should not be approved by the State Water Board at this time.

It is true that a WDR (or Waiver) can b approved independently of a TMDL. However, in the case that a TMDL is dependent on a WDR (or other actions), that TMDL should be reviewed with the actions that were designed and necessary to support (or complete) the TMDL Action Plan.

In the Case of the Elk River TMDL approval process it is obvious there is a problem (project segmentation and a WDR that is not consistent with the TMDL). The State Board needs to look at this issue and look for ways to solve this problem.

We suggest that the approval of the Elk River TMDL Action Plan be withheld by the State Board until such time that the WDR(s) are sufficient in control language to limit pollutant inputs from timber harvest operations.

CHANGES THAT WERE MADE IN THE WDR THAT DO NOT SATISFY REQUIREMENTS

There were numerous changes made in the language of the WDR. Many of the changes were for clarification and/or application of more appropriate control language. However there were several changes that were substantial and will have great effect on the application of controls necessary to attain Water Quality Standards (as per the Technical Analysis and Initial Study).

The WDR acknowledges continuing sediment inputs from land use (timber harvest and related activity – including increased peak flows from vegetation loss and modification of hydrology, road runoff – from wet weather hauling, and sediment production from harvest) – where the introduction of this sediment is exacerbating the continuing impairment and diminishing beneficial uses.

The WDR states that the Forest Practice Rules are capable of addressing sediment production issue. And, added to the WDR is language from the FPRs – stating that no plan can be approved that does no comply with the Basin Plan. The WDR fails to point out that many, if not most, Timber Harvest Plans that are approved do not necessarily comply with the Basin Plan (it happens all the time). And, that the Elk River is impaired, primarily from timber harvest plans that were approved and supposedly consistent with the Basin Plan. Yes! The EO of the Regional Board can refuse to enroll a THP, or state that the plan is not consistent with the Basin Plan and thus cannot be

approved by CalFire and the Board of Forestry. However, that never happens – as there is an institutional barrier to such action.

The WDR (and related documents) noted excessively high risk sub-watersheds – where sediment production is excessive (greater than the other sub-watersheds in upper Elk River) and where more stringent controls and/or a prohibition in logging activity should take place.

The WDR (and related documents) indicates that road, and skid trails, produce sediment from logging operations – especially during wet weather operations.

The WDR (and related documents) acknowledge that timber harvest and related activity – no matter what controls are put in place – produce some sediment. Timber harvest land use activity on slopes with potential for erosion will produce sediment – which is carried down stream by rain events.

The WDR acknowledges that stringent land use controls must be put into place – and the phased approach that is found (as per the Technical Analysis, Initial Study, TMDL) to be necessary for recovery of beneficial uses – and – that the phased approach to remedy is dependent on Phase I – the application of stringent controls to inhibit (and in some cases stop) sediment production and delivery to the water course(s). And, also stated is the fact that recovery is also dependant on the effectiveness of other phases (non-regulatory actions – not fully described) to supplement to the recovery effort.

The major areas of application of stringent controls in the WDR – that were altered, or limited, in the approval process were: Stream Protection, temporary curtailment of logging in high-risk sub-watersheds, and wet weather operations. With these changes (which were inconsistent with the Technical Analysis and Initial Study), it can be fairly argued, were substantial – and should have subjected the WDR to re-circulation for public and agency comment.

Stream Protection

The WDR (and related documents) noted greater potential for sediment introduction in the upper watershed – Class II, and Class III streams. The WDR did place more emphasis on the Class II and III protections – with a no cut zone and wider buffers than the standard FPRs. The proposed WDR language for Class III streams indicated that a 20' no-cut buffer with 70% canopy to be retained for the remainder of the Riparian Management Zone. In the approved WDR language canopy overstory retention standards have not been improved (over the basic FPR or HCP operating standards – which the Technical Analysis shows to be defficient). Retaining 50% of the overstory in Class IIIs may not be sufficient to limit sediment production.

Additionally, the Class I overstory protection beyond the 50' no cut zone only allows for retention of 50% of the overstory (as per the HRC HPC operating standards). This is less than the current Forest Practice Rule Anadromous Salmonid Protection rules that are now in place.

Given the information in the Technical Analysis (the conditions and actions required to attain WQS) there is no rational reason why the Regional Board should accept the stream conditions set

forth in the HCP (which was developed many years ago and are clearly not sufficient- and – when the rate of harvest was lower and the problematic stream conditions did not exist). The information provided supports the use of extraordinary stream protection(s) – and at the very minimum the base line standards now set in the Forest Practice Rules (including ASP rules) necessary in the RMZ of anadromous streams on the north coast.

It appears that the WDR controls, as applied and approved, are a mix of HRC's HCP, operating standards in Elk River, and what the Regional Board sees as necessary – without consideration of added protections for high risk sub-watersheds and or use of the FPR ASP rules or the WDR applied protections which ever is the most protective. The concern here is that the protections will not limit loss of vegetation cover to a point where peak flow impacts from timber operations are reduced to almost nil (which are the major concerns noted in the Technical Analysis, Initial Study, and TMDL – as necessary to get close to the objective of zero net loading).

There is no consideration of more restrictive stream protections for "high risk" sub-watershed(s) – or high risk erosive soil/geologic areas. This is important as they removed the prohibition of logging in "high risk" sub-watersheds – but applied no additional protections. It would be logical to add more stringent controls in the "high risk" watersheds.

High Risk Sub-Watershed (Management)

The Board made several changes to controls for timber harvest and related activity in high-risk sub-watersheds (or high risk erosive areas). The prohibition of timber harvest activity for 5 years (with option to lift the 5 year restriction if data and studies supported that action) was removed. The conditions that define "limited " in this case are unclear. Also, the undefined limitations in the high-risk sub-watersheds were to be reviewed in no less than 5 years. What is to occur after such review is unclear.

The definition of "high-risk" watershed (in this document referred to as high-risk sub-watershed) was changed to areas known to be of high risk of erosion due to a specific erosive soil type and geology. The "high-risk" watershed concept is one of recognition and prioritization of risk factors. The risk factors can be related to soils, geology, hydrologic interception, average slope, average vegetation cover, etc.. The issue related to this change is that there may be other specific criteria related to defining an area as "high-risk" – other than geology or soils. It might be important to recognize these "high-risk" areas and apply specific elevated protections (not limited to controls on harvest) to apply the most appropriate management in the most appropriate sequence. Defining "high-risk" by one (or a few) limited factors may not lead to desired outcomes. The Technical Analysis speaks to this issue.

A reasonable approach to the management of the high-risk sub-watersheds, with a target of ZERO loading, would include additions of specific management controls – i.e. additional stream protections, lowering the rate of harvest, maintaining a larger percent of overstory or vegetation cover, and more stringent wet weather controls (see Winter/Wet Weather Ops – below)

There was no consideration to more restrictive stream protections for "high risk" sub-watershed.

This is important as they removed the prohibition of logging in "high risk" sub-watersheds – but applied no additional protections (other than specific protections applied to areas of a specific soil type). It would be logical to add more stringent controls in the "high risk" watersheds

Winter/Wet Weather Operations – Tractor and Road Use Limitations

Winter/wet weather operations are cited in the WDR (and supporting TMDL documentation) to produce measurable amounts of sediment (a controllable discharge). Specific Winter Hauling limits were included in the proposed WDR. The proposed WDR was changed to allow expanded wet weather operations, logging and hauling, under wider control margins. This change may result in unnecessary inputs of sediment and limit recovery capability.

After expanding permitted operations during winter (or wet periods) the WDR applied no consideration to more restrictive winter/wet weather controls for "high risk" sub-watershed. This is important as they removed the prohibition of logging in "high risk" sub-watersheds – but applied no additional protections for these operations that are known to discharge sediment. It would be logical to add more stringent winter/wet weather controls in the "high risk" watersheds

Harvest Levels

The WDR document findings indicates that HRC plans future harvest to be approx. 1.5% equivalent clear-cut acres (averaged over the watershed). This number is below what the WDR indicates is the concern level – 2.0% equivalent clear-cut acres – where the regional board may decline to enroll THPs indicating and exceedence (beyond a concerned level boundary). HRC claims that their rate balances overstory maintenance. The Technical Analysis indicates peak flows are a very large issue – and – the issue is related to vegetative cover (loss) as well and hydromodification.

Again, the high-risk sub-watersheds are not receiving the necessary additional protections which are warranted under the Technical Analysis, Initial Study, and the initial proposed WDR control language.

Basin Plan – Anti-degradation Requirements

Though Basin Plan anti-degradation requirements (and State Non-point Source Policy) are considered in the Technical Analysis and Initial Study as requirements for abating controllable sources of sediment, the WDR ignores these requirements. These requirements, as indicated in the Technical Analysis and the Initial Study call for more stringent controls as necessary for Phase I Implementation – leading the way for the application of subsequent Phases/actions.

Please Review the attached Technical Analysis language with CAG comments interspersed – as a supplement to this document.

Sincerely, Alan Levine for Coast Action Group

ELK RIVER TMDL and Action Plan - COMMENTS – based on Elk River Technical Analysis by Coast Action Group

Coast Action Group has participated in the TMDL processes in California form the very first TMDL CAG has participated in the development of numerous TMDLs and related Implementing Programs related to impaired waterbodies on the north coast. We see TMDLs, and related Implementing Programs (WDRs, Waivers, and COAs) of viable tools for recovery of impaired waters in California. We have noted that recent State TMDL approvals (Scott River, Shasta River) with related Implementing Programs have not been designed to effectively address the impairment issues – as the related Implementing Programs put in place are not fully developed and do not meet the requirements of State Code.

We have also noted that when programs are put in place that meet the requirements of Cal Water Code and CEQA there can be demonstrated success – i.e. the Garcia River TMDL for Sediment and Implementation Plan for Sediment Control. The Garcia TMDL and Action Plan has worked – where success is demonstrated by improved stream conditions the observed return of salmonids to the Garcia River that have not been seen for over 40 years.

CAG comments on the Elk River TMDL are offered in the hope that the State Board will refrain from approving this incomplete TMDL Action Plan until the action elements, WDRs, are made consistent with the supporting Technical Analysis and Initial Study. CAG"s method of commenting (in this document) is to review the Technical Analysis – with clipped and pasted pertinent aspects of the Technical Analysis (the Technical Document is the foundation and justification on which the TMDL is based – and must be reviewed in total, along with comments, to fully understand the issues) into this document and provide comment between those clipped portions of the Technical Analysis – with CAG comments **in bold underlined** . This makes for a large document. We believe this is necessary so the reviewer of these comments need to be refreshed as to what the Technical document is saying and where the issues lie.

Technical Analysis – Review and Discussion of findings

Upper Elk River Technical Analysis for Sediment presents the data, analyses, results, and conclusions derived from watershed assessment efforts, as well as a review of the historical, management, and regulatory factors in the Elk River watershed that have influenced its sediment impairment.

(The Tech Analysis refers to an Internal Draft. Is the Internal Draft, noted in the Tech Analysis, available and part of the record? It is not noted on the Regional Board web-site)

1.1 Project History and Context

Due to water quality and beneficial use impairments, the Regional Water Board has taken a variety of regulatory and non-regulatory actions in the Elk River watershed to protect and restore beneficial uses and abate flooding conditions. Following an intensive period of petitions, hearings, investigations, and analyses between 1997 and 2006, the Regional Water Board undertook a series of actions including the placement of Elk River on

the303(d) list, issuing Cleanup and Abatement Orders (CAOs) and Monitoring and Reporting

Programs (MRPs), undertaking TMDL development, and developing and adopting Property-wide WDRs for industrial timberland owners. Appendix 2-C (History of Regional Water Board Regulatory and Non Regulatory Actions in the Upper Elk River Watershed) of the Peer Review Draft (Regional Water Board 2013a) provides a review of regulatory actions in the watershed

The Regional Water Board sponsored two phases of evaluations by an Independent Scientific Review Panel (ISRP). The ISRP authored two reports (December 27, 2002 and August 12, 2003) and concluded that 1) a rate of harvest aimed at reduction of harvest related landslides could be determined with available landslide inventories and harvest history data, and 2) flooding and water quality standard impairment would continue as long as sediment loads remained elevated. The ISRP recommended that detailed sediment process data be collected to inform future analysis. They further found that the Timber Harvest Plan (THP) process defined by the Forest Practice Rules (FPR) and the Habitat Conservation Plan/ Sustained Yield Plan (HCP/SYP) process was not sufficient to guarantee water quality protection and recovery

1.2 An Evolving Collaborative Approach

The Regional Water Board has a duty to implement the CWA, the Porter Cologne Water Quality Control Act (Porter Cologne), the *Water Quality Control Plan for the North Coast Region (*Basin Plan; Regional Water Board 2011a), and other plans and policies of the State Water Resources Control Board (State Water Board) and Regional Water Board for theprotection of water quality.

Discussion of Steward ship program (see further discussion at the end of this paper), as a colaborative effort. However, no programs or activity has been devised and noticed to address the severe impairment Issues. Instead the TMDL and appurtenant WDR rely on undefined programs (envisioned framework is to be used to develop a program) - instead, first, implementing necessary controls suggested by the Tech Analysis and supporting documentation

The combination of regulatory and non-regulatory activities, now under the umbrella of stewardship, is intended to address the following four components of a recovery strategy:
1. Control of new sources of sediment (current operations),
2. Control of existing sources of sediments (areas of elevated erosion risk),
3. Expansion of the assimilative capacity for sediment in the impacted reach through remediation of deposited sediment and restoration of hydrologic function, and
4. Installation of physical infrastructure to address nuisance conditions (e.g., flooding, water supplies)

Neither the TMDL or approved WDR have in place actions or programs that would accomplish #1 through #4. The Tech Analysis and TMDL indicate load allocations and

source reduction targets – but they are not sufficient or enforceable as the TMDL and Implementing Program/WDR lacks language to control sources of sediment as described by this document.

Supporting documentation for this analysis and the TMDL includes: Data on sediment from revision of the initial sediment loading estimates - from original TMDL estimations, updated TMDL estimates with supporting documentation - with a conceptual model for formation of the "framework", and Peer review of data and conclusions, public comment on proceedings information, recent revision of AHCP data on habitat and stream conditions, analysis of effects of hydrologic events as related to sediment delivery and impairment, and predictive modeling.

Tetra Tech did quality control checks and modeling on all of the above - deriving the following:

A conceptual model of the ecological risks associated with natural and anthropogenic influences in the Upper Elk River watershed;
Changes to the estimates of natural sediment loading in the sediment source assessment;
A comparison of the estimated loads to other loading calculations
Mass-balance estimates for the impacted reach4 (2003 – 2011);
Alternative presentation of the assimilative capacity; and
Implementation framework divided into two phases.

These changes do not constitute a new TMDL, rather they reflect a refinement to the Peer Review Draft that considers new information from the stakeholders and peer reviewers.

Chapter 2 – Watershed Setting

2.1 Delineation of the Upper Elk River Watershed

The Regional Water Board also delineated that portion of the 58 square mile (mi2) Elk River watershed that drains to the impacted reach.

Mapping shows mostly conifer hardwod forested area - and - division of landuse ownership between the larger owners HRC and Green Diamond.

2.3 Climate and Hydrology

Mediterranean climate of the Elk River - wet winters and dry summers - 39 to 60 inches of rain per year.

According to the Regional Water Board's assessment (from USGS records - 10 years prior), the domestic water supply beneficial use was supported and there was evidence that suggests

excessive flooding did not regularly impact residents in the Upper Elk River during this period (Dudik1998; RCAA 2003; Wrigley 2003). As such, these data offer a baseline condition on the mainstem of the Elk River, which represents a target condition. The estimated recurrence intervals of various peak flow events that are derived from these data are presented in Table 3.

Note: the affected reach is a low gradient stream - where sediment, naturally occurring and anthropogenic, goes to the bottom and resides there - where the hydromodified stream condition can not move sediment out fast enough – where these conditions induce flooding, other nuisance conditions, and impairment. Additionally, the consideration of climate change indicates additional future negative effects. The final TMDL calculations do consider a margin of error. It is not clear that the load allocations and waste load allocations address changing weather patterns associated with climate change.

2.4 Topography

The topography of the Elk River watershed shows extreme differences (Figure 6). The forested headwaters are generally steep slopes, while the grassland coastal plain is relatively flat.

2.5 Geological Setting

The watershed is comprised primarily of geologically recent and erodible geologic formations (Figure 7).

Tech Analysis notes Highly Erodible conditions - especially due to climate change - frequency and duration of rain events.

Current stream bed conditions are substantially degraded by fine sediment, which coats the stream bed and banks. Stream substrate is very fine, potential spawning gravels are significantly embedded, and pool depths have been decreased by sediment filling (Regional Water Board 2013a).

2.5.2 Tectonics

Subsidence of the baylands in the Elk River flood plain is occurring due to the down warping related to tectonic activity and to compaction and diking of the lower portions of the watershed. Uplift, caused by tectonic movement, is balanced by erosion via channel incision and steep slopes. Additionally, high uplift rates result in steep slopes and shallow soil. Figure 8 presents the relationships between tectonic uplift, subsidence, and sea level rise. The net effect of this relationship is:

Steeper slopes that affect soil stability and landslide frequency;

High rates of channel denudation;

Steeper stream gradients with higher energy profiles in the upper watershed;

Lower stream gradients and elevations creating a longer depositional area and length of stream under tidal influence in the lower reaches; and

Back water effect from sea level rise, which affects the flood potential in the impacted reach

Chapter 3 – Regulatory Setting

The Regional Water Board is the state agency responsible for the protection of water quality in the Elk River watershed. The Regional Water Board implements the Porter Cologne Act5, which is the state law governing water quality protection activities as authorized by the State Legislature. The Regional Water Board, in part, is also tasked with implementing the requirements of the federal CWA.

3.1 Impaired Waters

The State Water Board, with Regional Water Board input, periodically identifies waters that are not meeting WQS. The State Water Board is required, under Section 303(d) of the federal CWA, to develop a list of those waterbodies in California where technology-based effluent limits or other legally required pollution control mechanisms are not sufficient or stringent enough to meet the WQS applicable to such waters.

Placement of a waterbody on this list generally triggers development of a pollution control plan, referred to as a TMDL. In California, the authority and responsibility to develop TMDLs rests with the nine regional water boards. The TMDL process leads to a "pollution budget" which quantifies the pollution reductions necessary to restore the health of a polluted body of water. Specifically, a TMDL is the calculation of the maximum amount of a pollutant that a waterbody can receive and still meet WQS and provide supportive conditions for the beneficial uses of water.

In part, the statement above in incorrect - the State must accomplish a TMDL with an Action Plan (Water Quality Control Plan - with a description of actions necessary to attain - under Cal Water Code)

Consistent with recommendations by the Regional Water Board, Elk River was added to the 303(d) list in 1998. The listing was based on evidence of excessive sedimentation/siltation loads from land management activities in the upper portion of the watershed. Water quality problems cited under the listing include the following:

Sedimentation and threat of sedimentation;
Impaired domestic and agricultural water quality;
Impaired spawning habitat;
Increased rate and depth of flooding due to sediment; and
Property damage.

3.2 Waste Discharge Requirements and Cleanup and Abatement Orders

Current management of the Elk River watershed for timber harvest is conducted under several permits issued by the Regional Water Board.

Implementing Programs (WDRs, Waivers, COAs, or other permits or Water Quality Control Plans) can satisfy the requirement of the need for Actions necessary to attain WQS. However, the TMDL and related Implementing Programs must comply with Cal Water Code Section 13242 and CEQA (with a complete description of the project – in this case the complete Water Quality Control Plan, analysis of effects, mitigatory process, and monitoring program).

Cal Water Code §13242 .[Implementation]

The program of implementation for achieving water quality objectives shall include, but not be limited to:

(a) A description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private.

(b) A time schedule for the actions to be taken.

(c) A description of surveillance to be undertaken to determine compliance with objectives.

3.2.1 Humboldt Redwood Company

HRC currently operates under Order No. R1 2006 0039, an Elk River watershed specificWDR issued by the Regional Water Board in 2006 (Regional Water Board 2006a).Treatment of road related controllable sediment discharge sources (CSDS) have beenconducted under CAO Nos. R1 2004 0028 (for the South Fork and Mainstem Elk River) and R1 2006 0055 (for the North Fork Elk River). All Orders that pertain to HRC's current activities were originally issued to Palco and amended by Order No. R1 2008 0100 to reflect HRC's ownership of the former Palco holdings. These orders were developed to compliment the HCP that covers the HRC properties (Palco 1999).

It is demonstrated that the above orders are old and do not address continuing issue as continuing adverse effects from timber operations that are documented in the Tech Analysis – with an outline of factors that must be controlled to attain WQS

3.2.2 Green Diamond Resources Company

GDRC currently operates in the South Fork Elk River watershed under two WDRs. In 2010, GDRC was issued a WDR (Order No. R1 2010 0044) by the Regional Water Board for discharges related to road management and maintenance activities conducted ownershipwide. Subsequently, in 2012, a WDR (Order No. R1 2012) was issued for discharges related to GDRC's forest management activities ownership wide. The 2012 forest management WDR relies on the prescriptions contained within GDRC's 2012 updates to its South Fork Elk River Management Plan. These orders were developed to compliment and make enforceable by the Regional Water Board portions of the AHCP (2007) that covers the GDRC properties.

Green Diamond holdings are a smaller part of the watershed – where HRC holdings are substantially larger. Timber Harvest activities under these permits have not addressed ongoing impairment issues in the affected watershed – as indicated in the Technical Analysis – where the first step for applying necessary control are via the TMDL Action Plan/WDRs.

3.2.4 TMDL Analysis and Implementation

This document confirms several important findings, which can be addressed through TMDL analyses and implementation. Specifically, existing control mechanisms are not correcting the sediment impairment and the sediment source analysis confirms that the impairment continues to persist and worsen. It is also important to consider that the CWA requires a TMDL when waters are impaired and a TMDL can be adopted as a single action if a single regulatory mechanism will attain beneficial uses. However, EPA has a new TMDL vision6 that allows for an alternative restoration plan in lieu of a TMDL. As noted previously, this document provides the technical basis for a sediment TMDL and/or a WDR. It is a synthesis of all readily available information, which can be used to calculate a TMDL, support development of an alternative restoration plan, and/or revise the WDRs to ensure they provide reasonable assurance that the impairment will be corrected through their Implementation.

Currently there is no program in place, as called for in the Technical Analysis to be applied as per the TMDL Action Plan and related Implementation strategy (WDRs) (See – further discussion – below in this document)

3.2.5 Waste Discharge Requirements Under Development

Regional Water Board staff is currently developing revised WDRs for timberland owners in the Elk River watershed. The information and findings of the sediment analysis presented in this report are developed to inform such revisions and the development of additional permits, as necessary

The WDR on HRC lands, as approved, lacks the specific actions necessary to attain WQS. It is also the case that the TMDL Action Plan fails to address actions that are necessary. A WDR on HRC timber holdings was just approved by the Regional Board - where the Board did not follow the staff recommended actions necessary to attain WQS (as specific operating standards for timber harvest and related activity in the Upper Elk River – staff report on the proposed Board action and supported by the Technical Analysis and Initial Study)

Chapter 4 – Desired Watershed Conditions

The Tech Analysis provides a description of Water Quality Standards applicable to the Elk River and stream condition Targets to be applied to the TMDL and/or related WDRs (or Implementing Programs), This information is based on the recovery potential – given known and comparable conditions.

4.1 Water Quality Standards

WQS are adopted by the Regional Water Board to protect public health and welfare, enhance the quality of water, and serve the purposes of the federal CWA (as defined in Sections 101(a)(2), and 303(c) of the CWA). WQS, as described in the Basin Plan (Regional Water Board 2011a), consist of 1) designated beneficial uses, 2) the WQOs to protect those beneficial uses, and 3) implementation of the Federal and State policies for **antidegradation**. In accordance with the federal CWA, TMDLs are set at a level necessary to achieve applicable WQS.

Note: Antidegradation policy in the Basin Plan is an enforceable standard (as is Cal Water Code) for TMDLs and Implementing programs – where controllable sources of pollutants must not be allowed to be introduced into already impaired waterbodies, thus inducing further impairment or retarding recovery. (See 4.1.3, 4.1.4, & 4.1.5)

4.1.1 Beneficial Uses

Beneficial uses of water (beneficial uses or uses) are those uses of water that may be protected against quality degradation.

The beneficial uses of primary focus in this document for the Upper Elk River include: domestic drinking water (MUN) and agricultural (AGR) water supplies and salmonid habitat (including cold freshwater habitat [COLD]; rare, threatened and endangered species [RARE]; migration of aquatic organisms [MIGR]; spawning, reproduction, and/or early development [SPWN]). These are shown in bold in the list above. Water contact recreation (REC-1) is also a key

4.1.2 Sediment-Related Water Quality Objectives

Basin Plans contain both numeric and narrative WQOs to support beneficial uses. These WQOs specify limitations on certain water quality parameters that are not to be exceeded. The sediment-related objectives pertinent to the Elk River watershed are:

- **Suspended material**: Waters shall not contain suspended material in concentrations that cause nuisances or adversely affect beneficial uses.
- **Settleable material**: Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affect beneficial uses.
- **Sediment**: The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
- **Turbidity**: Turbidity shall not be increased more than 20 percent above naturally occurring background levels. Allowable zones of dilution within which higher percentages can be tolerated may be defined for specific discharges upon the issuance of discharge permits or waiver thereof.

All four of these WQOs are associated with the salmonid habitat beneficial uses of concern (COLD, MIGR, RARE, and SPWN). In addition, the turbidity, suspended sediment, and

settleable material WQOs directly protect the water supply uses (MUN and AGR). WQOs are either explicitly or implicitly designed to prevent nuisance conditions

4.1.3 Controllable Water Quality Factors

Porter Cologne and the Basin Plan also contain a provision for "controllable water quality factors" as described below:

Controllable water quality factors shall conform to the water quality objectives contained herein. When other factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, then controllable factors shall not cause further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from man's activities that may influence the quality of the waters of the State and that may be reasonably controlled. **(From the Basin Plan)**

If controllable water quality factors are affecting the support of WQS, actions must be taken to bring those factors into conformance with Basin Plan objectives such that beneficial uses of water are maintained and restored. This provision specifically supports the development of hillslope WQIs, as described below.

4.1.4 Antidegradation Policies

There are two antidegradation policies that are applicable to all waters in the North Coast Region — a State policy and a federal policy. The State antidegradation policy is titled the *Statement of Policy with Respect to Maintaining High Quality Waters in California* (Resolution 68-16). The federal antidegradation policy is found at title 40, Code of Federal Regulations, Section 131.12. Both policies are incorporated in the Basin Plan for the North Coast Region (Regional Water Board 2011a). Although there are some differences in the state and federal policies, both require that whenever surface waters are of higher quality than necessary to protect the designated beneficial uses, such existing quality shall be maintained unless otherwise provided by the policies.

4.1.5 State Policy for Control of Nonpoint Sources of Pollution

The 2004 State Water Board *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (NPS Policy) establishes requirements for both nonpoint source dischargers and Regional Water Board regulation of those dischargers (State Water Board 2004). The NPS Policy requires that the Regional Water Board use its administrative tools (e.g., WDR, waiver of WDRs, and prohibition) to address all nonpoint source discharges of waste and ensure compliance with all nonpoint source (NPS) pollution control requirements. In this way, the NPS Policy "provides a bridge between the NPS Program Plan and the [State Water Board] Water Quality Enforcement Policy" (State Water Board 2004).

Non-Point Source Policy is another piece of the legal framework that requires actions necessary to attain WQS (in this case)

4.2 Numeric Targets: Water Quality Indicators

Numeric targets are used as a means to express narrative WQOs. Specifically, numeric targets offer a means to evaluate attainment of WQOs and the beneficial uses they protect. They are a mechanism to document measureable improvement. However, it is important to note that numeric targets are not WQOs; they are not enforceable unless they are incorporated into future permitting or regulatory actions (it is anticipated that a subset of the numeric targets identified below could eventually be incorporated into permits). If targets are incorporated into permits (and therefore become enforceable)

The Instream WQIs 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[9] 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[10] within the bankfull channel, particularly within the impacted reach

While the Instream WQIs focus on conditions within the stream channel, it is also important to manage and improve conditions on the land. The Hillslope WQIs collectively describe hillslope conditions that are expected to support attainment of beneficial uses. This is accomplished by reducing the signature left on the landscape from land use activities. The Hillslope WQIs describe conditions in which sediment delivery, hydrology, and large woody debris recruitment supports attainment of beneficial uses, as measured by trends in the Instream WQIs.

4.2.1 Instream Water Quality Indicators

Instream WQIs offer a suite of numeric targets to strive for and to gage improvements in the aquatic system. Table 4 identifies the Instream WQIs, their associated instream goal, numeric target, and the associated stream type - with WQIs for Flood discharge capability, domestic water supply, and salmonid survival.

Numerous sediment TMDLs throughout the region11 adopted by the Regional Water Board and EPA include Instream WQIs generally focusing on salmonid habitat quality, including sediment composition, pool depth and frequency, and large wood. While this report does not identify WQIs for those aspects of salmonid habitat, they may be adapted from a variety of applicable studies as well as compilations of habitat indictors and values including the *Desired Salmonid Freshwater Habitat Conditions for Sediment-Related Indices* (RegionalWater Board 2006b; see also Regional Water Board 2013a, 2013b for additional rationaleon use of specific indicators) as well as the National Oceanic and Atmospheric Association(NOAA) National Marine Fisheries Service *Properly Functioning Conditions Matrix* asincorporated into the HCP for HRC (USFWS and Calfire 1999).

Monitoring of Instream WQIs is critical to track progress toward attainment of WQOs and beneficial use protection and restoration. The stewardship process can assist with coordinated monitoring to track progress towards improved salmon habitat and water supplies and elimination of nuisance conditions

Is there a sufficient monitoring program in place – or – mandated in the TMDL Action Plan or WDR for HRC?

The development of salmonid habitat-related targets specific to Elk River should include the following considerations: (1)commonly applied salmonid habitat indices have been developed primarily for Franciscan geology (produces both course and fine sediment) and Elk River is primarily comprised of Wildcat Formation (producing primarily fine sediment); (2) sediment-related habitat needs vary by life stage for different salmonid species and specific values may not be appropriate for all life stages of all salmonids; and (3) generally with WQIs, a series of environmental conditions that trend toward the target conditions is the desired condition. When evaluated comprehensively, numeric targets can demonstrate attainment of beneficial uses; however, when evaluated individually, they should be interpreted as recommendations

4.2.2 Hillslope Water Quality Indicators

The proposed Hillslope WQIs are divided into two categories: 1) common indicators that are comparable to those adopted by the Regional Water Board in numerous sediment TMDLs or WDRs and 2) Hillslope WQIs that are specific to the Upper Elk River watershed due to its unique characteristics. A subset of these indicators may be translated to permit terms, so they become enforceable.

The Hillslope WQIs offer a suite of controllable factors that can be managed through the use of best management practices (BMPs) that can be implemented in support of beneficial use attainment (see Chapter 4.2.3 for a discussion on the application of WQIs). Table 5 depicts the Hillslope WQIs, associated instream goal, numeric target for each indicator, and the applicable area in the Upper Elk River watershed.

Table 5 provides WQIs as actions necessary to control Sediment inputs from the hill slope – including: Reduction of road use and construction related sediment production, reduction of sediment from timber harvest areas, with specific WQIs for actions necessary on the effected reach – including: Zero increase of the drainage network, limitation on peak flow increase from timber harvest, limitation of stream reaches with eroding banks, improvement in riparian zone condition in Class I and Class II streams, enlarging the width of Class III riparian zones and improving conditions in that increased zone.

The TMDL Action Plan does not adequately address these WQIs. (as stated in the Tech Analysis – should be part of permit/WDR or TMDL)

4.2.3 Application of Water Quality Indicators

The WQIs identified above can be applied in multiple settings. They help to:

- Establish appropriate metrics for ongoing monitoring, whether it is effectiveness monitoring, trend monitoring, or compliance monitoring;
- Determine appropriate control measures to be included in a regulatory mechanism,

including specific numeric permit provisions; and

- Establish adaptive management thresholds, appropriate for identifying temporal and spatial conditions for re-evaluation of the applied control measures.

Because NPS restoration is driven by BMPs, evaluating post-implementation monitoring data against these numeric targets can show if the BMPs are adequate to restore and maintain beneficial uses. BMPs prevent sediment from entering waterways and increase the potential that instream numeric targets will be met.

5.1 Watershed Conditions

The impacted reach has been identified as impaired for sediment as a result of three related factors: 1) excess sediment has been deposited on the bed, banks, and floodplain, reducing channel conveyance; 2) sediment delivered from the upper watershed is predominated by very fine particles, which can embed gravel; and 3) deposited material is readily colonized by vegetation, which anchors the material and reduces the potential for remobilization to move sediment out of the system.

5.1.1 Environmental Setting

As described in Chapter 2, the Elk River watershed has steep upland topography, erodible geologic formations, and a restricted, low gradient river mouth. The watershed is also tectonically active, with areas of localized uplift from folds and faults resulting in channel incision. These environmental factors all contribute to the potential for erosion in the upper watershed and subsequent deposition in the lower watershed. This erosion/sedimentation pattern is exacerbated by other factors, including landslides (natural and management-related) and anthropogenic activities

5.1.2 Historical Management and Land Use Activities

Timber operations continued in the upper watershed. In 1986, there was a marked increase in the rate and scale of timber harvesting and road construction activities with an associated increase in sediment discharges. In 1997, increased management controls were implemented in response to several new requirements associated with water quality and endangered species protections. These requirements led to the development and implementation of more robust controls aimed at reducing the land use impacts and have continued to be refined since that time.

Anthropogenic alterations in the Elk River watershed combined with the watershed setting risk factors, have led to alterations in the balance of water and sediment fate and transport.

5.1.3 Water Quality Monitoring

Over the past 15 years, various stakeholder groups have been conducting instream water quality monitoring and channel form evaluations at a number of locations. Monitoring efforts undertaken by industrial landowners, residential landowners, and others such as the fisheries and resident advocacy group, Salmon Forever, have verified the impaired nature of the beneficial uses in the watershed and provided data to support the development of a TMDL for sediment in the Upper Elk River watershed.

Table 11 indicates a very significant increase of harvesting in the upper watershed – and road density increases as well – the Tech Analysis associates this increased activity (under existing permits) with increased sediment inputs from timber management sites.

5.2 Impacts in the Watershed

This chapter describes impacts to the watershed from excess sediment including downstream flooding and impaired recreation, fisheries, and water supplies, which are the basis for listing the Elk River watershed as impaired under Section 303(d) of the CWA. Numerous watershed effects have manifested due to the land use history of the watershed. These include increased peak flows, increased drainage network, altered sediment storage, decreased channel complexity, and altered sediment transport which are discussed in detail in Chapter 6.1. These effects have in turn resulted in increased aggradation, increased turbidity, and decreased summer stream flows. Such effects can be dramatic, such as in the impacted reach where ongoing aggradation and vegetative colonization of fine sediment deposits results in notable and long-lasting impacts such as downstream flooding, impaired recreation, impaired fisheries, and impaired water supplies.

5.2.1 Beneficial Use Impairments

Numerous beneficial use impairments have been documented in the Upper Elk River watershed. These impairments include impacts to domestic and agricultural water supplies and impacts to recreational use of the river and degradation or loss of aquatic habitat.

5.2.1.1Domestic and Agricultural Water Supplies

Specifically, the North Fork has 12 surface domestic supplies, the South Fork has approximately 6-7 impacted surface domestic supplies, and the mainstem has at least 8 documented impacted domestic surface or shallow well water supplies

5.2.1.2Salmon-Related Beneficial Uses

While there are reaches providing salmonid habitat, in general, current habitat conditions are substantially degraded by fine sediment. Stream substrate is very fine, potential spawning gravels are significantly embedded, pool depths and stream channel depths have been decreased by sediment filling (thus reducing salmonid ability to rear, avoid predators, and migrate during low-flow periods), and high suspended sediment concentrations and durations affect feeding and rearing behavior.

5.2.2 Nuisance Flooding

In addition to the beneficial use impairments, nuisance flooding is another concern in the watershed. Discharges of sediment and small organic debris to watercourses have aggraded stream channels in the low gradient reaches of the Elk River, significantly reducing channel capacity. Overbank floods now occur at a frequency of four times per year on the North Fork Elk River (Regional Water Board 2005).

Potentially serious impacts to health and safety are associated with these flood events, as residents attempt to cross floodwaters, emergency vehicles are limited from accessing

homes, and power can be lost to people dependent on health-support machinery and other people for care

Chapter 6 – Sediment Source Assessment

6.1 Factors Controlling Sediment in the Elk River Watershed

Multiple natural and anthropogenic factors influence the behavior of sediment in the Elk River basin. The purpose of this chapter is to describe linkages among those factors and illustrate how they impact sediment delivery and the watershed's responses. Primary *natural* factors include: tectonics, geology, soil characteristics, geomorphology, climate and vegetation. Primary *anthropogenic* factors include: timber harvest, yarding, road building and use, and legacy practices (e.g., pre-Forest Practice Rules) not captured in the other categories (e.g., splash dams, stream channel skidding).

Again, it is pollution production from timber harvest activity that must be controlled- to reduce sediment delivery to surface waters and reduce peak flows and sediment production from peak flows (and reduced lag time to peak).

6.1.1 Dynamic Equilibrium and Attainment of Water Quality Standards

A functioning natural system occurs as a result of multiple factors or processes that interact under various environmental conditions, but result in a *dynamic equilibrium.* Dynamic equilibrium can be defined as "the condition of a system in which inflow and outflow are balanced" (Eastlick 1993) and the character of the system remains unchanged[14]. Balanced inflow and outflow is associated with the movement of both water and sediment. The geomorphic role of rivers is to transport flows andsediment from the watershed while maintaining its dimension, pattern, and profile without aggrading or degrading significantly. A system maintaining this role would be in a state of dynamic equilibrium. The feedback mechanism between sediment input/output is central to the dynamic equilibrium of a river channel (EPA 2012). The relative balance in sediment input/output is also central to the attainment of WQS, including achieving WQOs for sediment, turbidity, suspended sediment, and settleable matter; protection of beneficial uses related to water supplies and aquatichabitat; and prevention of nuisance conditions related to flooding, property damage, andloss of free access to and use of property.

The Elk River is aggrading (Chapter 6.2.4); therefore, it is not in dynamic equilibrium. This aggradation has resulted in beneficial use impairments and nuisance flooding and, as described in Chapter 5.2, the Elk River is not attaining WQS. Returning the river to a state of dynamic equilibrium that meets WQS is the ultimate water quality improvement goal for the Elk River.

6.1.2 Anthropogenic Factors

Chapter 5.1.2 provides a detailed description of how the Elk River watershed has been altered by anthropogenic activities over the past 150 years. These alterations have combined with other factors (discussed in Chapter 5.1.1 and below) to result in an alteration in the fate and transport of water and sediment through the watershed

6.1.3.3Watershed Responses

As illustrated in **Row C** of Figure 12, the combination of natural watershed conditions and anthropogenic factors intersect to create *watershed responses.* The most notable responses
are increased sediment production, altered hydrology, and reduction of LWD recruitment trees. Watershed response terms identified in the figure are defined below.

Reduced Slope Stability:

- Slope stability is the resistance of a natural or artificial slope or other inclined surface to failure by landsliding.
- Slope stability in forested settings can be reduced by:
  - decreased root strength from timber harvesting;
  - increased pore water pressure inside soils and in soil pipes;
  - road construction on hillslopes utilizing partial bench or full bench construction; and
  - sidecasting from legacy road construction activities, which oversteepens the outboard edge of the road

Soil Exposure:.
Increased Soil Compaction
Landslides
Watercourse Channel Erosion:
Erosion
Surface Erosion.
Subsurface Erosion
Channel Simplification
Riparian Zone Simplification:.
Pore Pressure
Reduced Root Strength:
Reduced Canopy Interception
Increased Sediment Production

Altered Hydrology:
Reduction of LWD Recruitment Trees: Timber

6.1.3.4Watershed Effects

Increased peak flows: Runoff associated with rainfall events results in increased stream flow. The highest stream flow rate achieved in response to a storm is referred to as peak flows. During storm events, the instantaneous stream peak flows from storm events is a function of antecedent wetness at the onset of the storm, storm intensity and duration, drainage area size and shape, and vegetative cover. Canopy removal associated with timber harvesting and alterations to hillslope drainage associated with roads and compacted areas can alter the magnitude and timing of peak flows. Data from Caspar Creek suggest that the peak flow response for single-tree selection logging may be about 60 percent of that for the equivalent canopy removal by clearcutting (Reid 2012). Additionally, a recent study found that during rainfall events, 30-40 percent more water fell on the ground (effective rainfall) in an opening than under forest cover (Dhakal and Sullivan 2014). When considering this in combination with

transpiration, approximately 50 percent more water can be available in forest openings during the wet season (Lewis and Klein 2014).

Increased drainage network:
Altered sediment storage:
Decreased channel complexity:
Increased aggradation:
Altered sediment transport:
Decreased summer stream flows:

All of the above noted issues have anthroprogenic linkage – (including increase in peak flows – which is directly related to vegetative removal and hydromodification)- where the natural processes are aggravated by land use/management resulting in very large increases of sediment inputs – and where the primary land use is Timber Harvest.

6.1.3.5Watershed Impacts
As shown in **Row E** of Figure 12, the responses and effects of altered sediment loading has resulted in watershed impacts that include downstream flooding, impaired fisheries, and impaired water supplies

6.2 Quantitative Source Analysis

6.2.2 Sediment Load Estimation Approaches

Sediment conditions in the watershed are greatly influenced by altered hydrology and the reduction of LWD, as well. The routing of the delivered sediment through the fluvial system is not analyzed as part of the source analysis, except to say that increases in peak flows and reduction in LWD have influenced the way in which sediment is routed through the fluvial system, and sediment routing should be an important subject of further sub-basin scale surveys.

6.2.2.1Natural Sediment Loading Categories

Natural background levels considered – with estimates provided in Table 7

6.2.2.2Management/Land-Use-Related Sediment Loading
This chapter 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

6.2.3.1Sub-basin Loading

Table 8 presents a summary of the sediment load by sub-basin. This information is useful to prioritize implementation opportunities (using both sub-basin and source category information) to reduce loads to the stream reaches by prioritizing sub-basin-category combinations with the highest risk of additional sediment delivery.

Figure 14 ranks sub-basins on a graph, based on the total estimated sediment delivery from each sub-basin during the most recent period (2004-2011) This graph identifies the Toms Gulch sub-basin as a clear outlier with exceptionally high rates of sediment delivery. The relative magnitude of total sediment loading for the 2004-2011 time period is between 400-600 $yd_3/mi_2/yr$ for over half of the sub-basins and several others fall just outside that range, indicating consistency in the spatial pattern of loading throughout the watershed.

During the 1988-1997 time period, open slope landslides and road related landslides were the dominant sources. Specifically, road-related landslides primarily impacted Bridge Creek, Lower North Fork, North Branch North Fork, Railroad Gulch, and Clapp Gulches, while open-slope landslides primarily impacted Lower South Fork, Railroad, Clapp Gulch, Tom Gulch, Lake Creek, and Bridge Creek. All of these sub-basins (with the exception of North Branch North Fork) drain to the impacted reach. The magnitude of discharges during that time period dwarfed other time periods and the location of those large discharges had a direct impact on the impacted reach and the loss of function of the Elk River

Pollutant Loads presented by Category and Sub-basin – separated by natural and management created – and Total Loading

Table 9 presents Loading by sediment source - where the landuse loading (with a percent controllable source) is far in excess of the natural – where the percent of the total added by land use varies from 68% to 81% - depending on the year of estimation. Thus, if the area of concern has zero percent assimilative capacity – input by controllable sources should be in the range of approx. 80% to 100%.

Figure 15 presents sediment loads by source category and time period (the same values from Table 9). 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 fromthese specific source categories (except streamside landslides). Sediment

deliveryattributable to land use activities has reduced over time from a high of 85 percent in the1988-1997 period to a low of 68 percent in the more recent period (2004-2011).

This statement, in the above paragraph, is highly dependant on duration and frequency of hydrologic events. Figure 15 – **graph showing loading by sources**

6.2.4 Sediment Transport and Storage

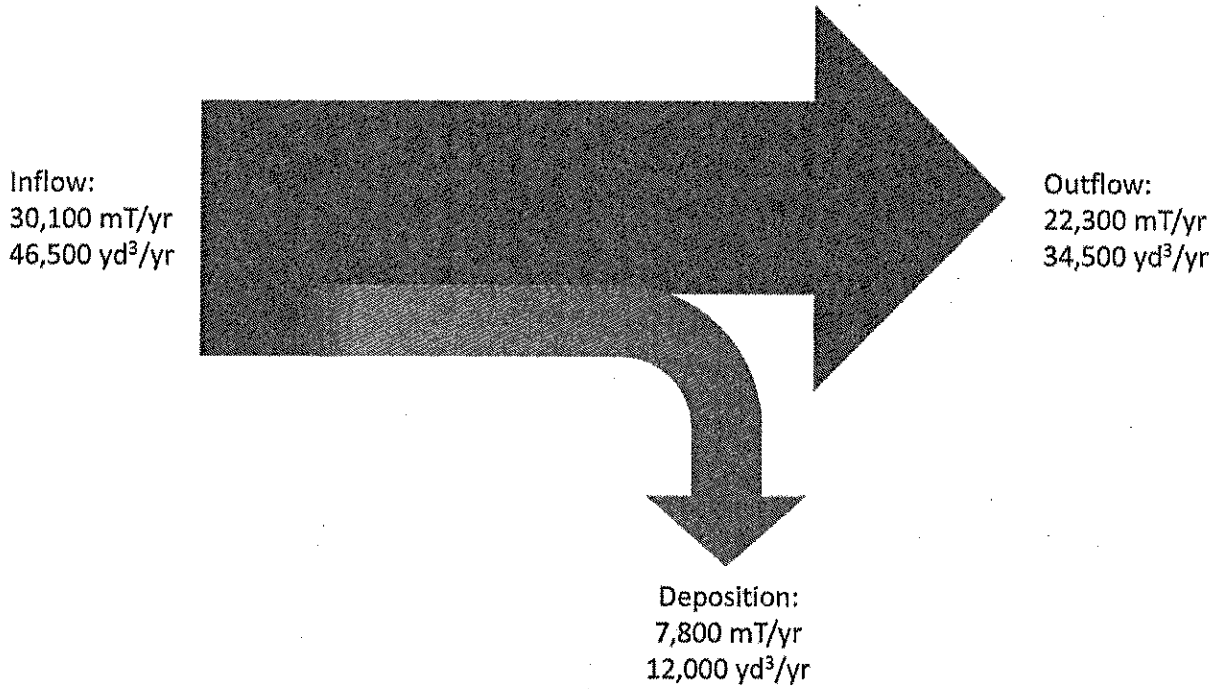
Sediment Transport and Storage is influenced by gradient, hydrodynamics/hydromodification (with minor human influence not attributed to timber harvest), metering by large wood (as a controller for sediment input distribution – somewhat limiting related impacts),

6.2.4.3Sediment Deposits in Impacted Reach

The Peer Review Draft identified significant sediment deposits as a primary driver of impaired beneficial uses and nuisance flooding conditions in the impacted reach of the Elk River, which contains the low gradient portions of lower North and South Forks and upper mainstem Elk River (Regional Water Board 2013a). The sediment deposits limit the discharge conveyance capacity, reduce velocities, and limit the stream's ability to pass water and suspended sediment.

Analysis of cross-section data indicates that recent loading, despite upslope reductions in sediment delivery (Table 9), has nonetheless continued to increase aggradation, including the deposition of sediment in the impacted reach (Lewis 2013; HRC 2012).

Mass Balance model shows increased storage of sediment/aggregate – leading to worsening conditions.



A majority of the sediment load that enters the impacted reach is passed through to the Lower Elk River. The portion (~26 percent) that is retained is sufficiently large to cause ongoing reduction in channel capacity (e.g., continued aggradation) that induces increased flooding, filling of pools, and other problems.

Under current conditions, sediment deposition within the impacted reach is excessive and there is no available assimilative capacity for additional loads

Chapter 7 – Sediment Loading Capacity and Load Allocations

The amount of sediment (or any pollutant) a waterbody can assimilate, while maintaining overall waterbody health and experiencing no harmful effects is known as the waterbody's assimilative capacity. The loading capacity of the Upper Elk River is defined as the total sediment load (natural and management-related) that can be discharged into the Upper Elk River and its tributaries without impacting beneficial uses of water, causing an exceedance of WQOs, or creating a nuisance condition.

The balance of sediment input/output may not be achieved every year, but if too little sediment is output (or too much is input) consistently (indicating that the waterbody is not in a state of dynamic equilibrium), then WQS may become impaired. Achieving a state of dynamic equilibrium that meets WQS is the water quality goal for the Elk River. It is anticipated that meeting the loading capacity described in this chapter will achieve this goal.

In light of these technical considerations, this document focuses on three key factors influencing attainment of beneficial uses and elimination of nuisance conditions:

a. Sediment remediation and channel restoration in the impacted reach to better achieve equilibrium conditions associated with sediment output at the bottom of the impacted reach (i.e., improving sediment transport capacity);

b. Control of sediment production and tributary routing as the mechanism to better achieve equilibrium conditions associated with sediment input at the top of the impacted reach; and

c. Document and/or quantify changes

7.1 Total Maximum Daily Load (TMDL)

As described in 40 CFR Part 130.79(c)(1), TMDLs must be established at levels necessary to attain and maintain the applicable narrative and numeric WQS with seasonal variations and a margin of safety (MOS),

TMDLs attribute pollutant load allocations (LAs) to natural sources and nonpoint sources[24] (e.g., natural background, non-National Pollutant Discharge Elimination System [NPDES][25] permitted discharges) and wasteload allocations (WLAs) to point sources (i.e., NPDES permitted discharges). In addition, the TMDL must include either an explicit or implicit MOS to account for uncertainties in the TMDL development process. The TMDL is represented by the following equation:

$$TMDL = Loading\ Capacity = \Sigma WLAs + \Sigma LAs + MOS$$

Furthermore- In California, under State Water Code – a TMDL is a Water Quality Control Plan and must be consistent with Cal Water Code and CEQA mandates (where the TMDL and Action Plan, including the WDR are one project – as a whole – and must considered and reviewed as one project. The TMDL and Action Plan – including the WDR - must describe actions necessary to attain WQS, have a prioritized or timed sequence for implementation of the necessary actions, and have a monitoring program in place to assess attainment progress and assure attainment of WQS (adaptation must occur if there if progress is not evident). Additionally, as this document noted, Basin Plan ant-degradation language supports this outcome

7.2 Phase I—Current Loading Capacity and Load Allocations

As discussed in Chapter 6.2.4.3, an estimated 640,000 yd^3 of excess sediment has been deposited in the impacted reach over approximately the past three decades.

Because of sediment aggradation, there is currently no apparent loading capacity for additional sediment within the impacted reach. This observation is based on (1) sediment

inflows to the impacted reach that exceed outflows, (2) continued aggradation in the impacted reach, (3) continued exceedances of sediment-related WQS, and (4) a delay before sediment remediation and channel restoration can be accomplished in the impacted reach, estimated by the Regional Water Board as 10-15 years

Without apparent capacity for additional sediment, the impacted reach of the Upper Elk River watershed has a current conceptual and regulatory sediment loading capacity of zero. This is conceptual, since using current technology and techniques, there is no amount of land use restriction and channel restoration that can physically result in zero loading of sediment (i.e., the control of all sediment discharge from the tributary system). This *regulatory* loading capacity cap should be maintained until the impacted reach's physical assimilative capacity has been expanded through sediment remediation and channel restoration during Phase I implementation.

In sum, Phase I of the TMDL is proposed to include a current sediment loading capacity of zero to prevent and minimize sediment delivery to the impacted reach. **As described below in Chapter 8, revised or new WDR(s) could be developed to control existing and new sources of sediment in a manner consistent with a zero LA.** Phase I would also include remediation and restoration within the impacted reach to reestablish the hydraulic function of the system

7.3 Phase II – Expanded Sediment Loading Capacity

A second phase of the TMDL (Phase II) could subsequently be considered, as described below. In Phase II the sediment loading capacity of the impacted reach could be recalculated and allocations redistributed.

Once sediment remediation and channel restoration of the impacted reach is accomplished, a process that is anticipated to be informed by the Elk River Recovery Assessment and supported by the stewardship group (Chapter 8), sediment delivery associated with land management and source control activities in the upper watershed might be sufficient to balance sediment input with sediment output through the impacted reach (to minimize changes in storage). The goal of proposed remediation and channel restoration is to restore a dynamic equilibrium in which WQS are attained in the Upper Elk River watershed. This is expected to expand the sediment loading capacity and restore hydrologic function, bringing into balance the sediment output from the impacted reach with the sediment input, thereby justifying the recalculation of the loading capacity in Phase II.

It appears that the only implementing program related to the TMDL Action Plan that is in place , WDR for HRC, fails effectively address the Phase I controllable sediment inputs from timber harvest activity (by considering the Tech Analysis language "As described below in Chapter 8, revised or new WDR(s) could be developed to control existing and new sources of sediment in a manner consistent with a zero LA – Section 7.2 Phase I – See also Section 8.1) and where the TMDL Action Plan proceeds

directly to Phase II - re-assessment of conditions and application of yet to be described restoration actions. Restoration, without controlling pollutant inputs and creating a balance (as noted in this document) will not work – and – is not consistent with Water Code, the Basin Plan, and CEQA.

Chapter 8 – Framework for Implementation, Monitoring, and Adaptive Management

The Regional Water Board has identified an implementation framework for the Upper Elk River watershed. They have identified a combination of regulatory and non-regulatory implementation actions that they believe will lead to recovery of beneficial uses and prevention of nuisance conditions in the Upper Elk River:

1. Revise applicable regulatory programs to reduce sediment loads from new and existing sources toward the load allocation,
2. Develop and implement an instream and channel remediation and restoration program to improvehydraulic and sediment transport in the impacted reaches of Upper Elk River,
3. Establish a watershed Stewardship Program to serve as an umbrella in support of beneficial use enhancement, prevention of nuisance, and a trajectory of watershed recovery

As noted above, the Reginal Board chose to skip #1 on this list, and #2 and #3 have yet to be described and are dependent of the success of a regulatory program that will sufficiently control sources of pollutant until a balance can be attained.

8.1 Sediment Load Reduction

WDR(s) is the primary regulatory mechanism utilized by the Regional Water Board to control the nonpoint source pollution resulting from past and ongoing timber harvesting activities, the primary land use in Upper Elk River watershed. Revision of the WDRs for the timberland owners are anticipated as the primary regulatory action needed to implement water quality improvements. Specifically, WDR revisions ensure that sediment load reductions from new and existing sources of sediment are consistent with a zero load allocation, through the application of a comprehensive prevention and minimization program, in combination with beneficial use enhancement projects. The prevention and minimization measures are informed by more than a decade of BMP implementation and sediment source tracking via ownership management plans, HCPs, CAOs, and ownership-wide WDRs. The updated WDRs are expected to be informed by the sediment source assessment, the hillslope WQIs, and technical reports from landowners and watershed partners. Through the WDR, together with regulated stakeholders, the Regional Water Board can enforce measures to prevent and minimize new sediment discharges, reduce existing sources of sediment loading, and restore watershed functions.

Sediment load allocations will not, and can not, sufficiently be reduced under the TMDL or recently approved WDR – as the controls needed, and suggested by this paper and Region 1 staff , are not in place.

8.2 Instream Remediation and Restoration

The actions called for in this section rely on:

1) Implementation (through promulgation of a WDR) sufficient land use controls on timber operations to limit sediment inputs to a point where there is some kind of balance. That has not occurred.
2) The programs discussed in this section rely on such improved conditions to where adaptive actions, supported by monitoring and an informed process, can be designed to aid in recovery. However, the adaptive actions (and proposed Stewardship Program) rely, in part, on the success of the indicated controls and design of these actions is also dependent on similar success in the pollutant reduction load. It absolutely clear that none of the restoration actions or processes have been designed or put in place. The very foundation of this process in shaky and incomplete – and fails to be consistent with the requirements of State Code.

Conclusion:

California Law requires: TMDL and related Implementing Programs (Action Plans - WDRs, Waivers, COAs), as Water Quality Control Plans, must meet statutory requirements (noted above in this paper). The State requirements, in short, insist on actions that will attain WQS.

The Technical Analysis provided for (and as part) for this TMDL Action Plan establishes that pollutant sources from land use (timber harvest) is causing exceedance of capacity for the water course receive pollutants and function without severely diminished beneficial uses. The Technical analysis provides the amounts of exceedence that need to be reduced and points to actions (in a permit/WDR) that must occur to meet the necessary reductions.

In this case the TMDL Action Plan is not a stand -alone document. The TMDL may provide the necessary Problem Statement, Source Analysis, and Load allocations and indicate the necessary reductions in pollutant loading that is necessary. Under State Code, as a Water Quality Control Plan the TMDL must have an Implementing Program (or Action Plan) that has a reasonable potential for success. The TMDL Action Plan must address attributes and issues indicated by the Technical Analysis for what is necessary for Phase I source control. The necessary TMDL actions and programs are not extant in the newly approved TMDL Action Plan or the WDR for HRC properties. Those actions are necessary for TMDL approval.

Additionally the TMDL. Action Plan, and WDR are not stand-alone documents. Together, and as a whole, they are a project and must be considered as same – with full description, analysis of impacts and related mitigations – and – with consideration of project alternatives.

Due to the fact that those actions are not in place appoval of the TMDL Action Plan as a Basin Plan amendment should be withheld until consistency is attained with State Code -

with the development of sufficient WDRs and other programs that will attain sediment reductions called for in the TMDL and the supporting documentation.

Submitted to the State Water Resources Control Board for review by.

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