YURUK TRIBE

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August 11, 2005

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

Subject: Comments on Draft Scott River TMDL

Dear Ms. Kuhlman:

I would like to start by expressing my appreciation toward your dedicated staff in their development these critical and challenging TMDLs on the northcoast. I would also like to applaud their continued effort to coordinate with Tribes on the technical issues. As you know, the Tribes have very limited resources and capacity to track and respond to the multitude of issues throughout the Klamath Basin. We understand that the board has the daunting task of completing these TMDLs in a limited timeframe with limited resources and that, in turn, these TMDLs may not take into account all of the available data, analysis or implementation measures necessary for adequate water quality protection in the long term. In recognition of this, we expect that these TMDLs will continue to evolve to include the appropriate level of data, analysis and implementation measures necessary to fully protect beneficial uses. Therefore, we have developed these comments for the record with assistance from our staff and consultants with the expectation that you will take them into account for the Scott TMDL before it is finalized to the greatest extent possible and strive to further address these issues after the TMDL is approved by the board.

If you have any questions or need further clarification or references for the following comments, please do not hesitate to contact Kevin McKernan, Environmental Director at (707) 482-1350 ext. 355.

Sincerely,

Howard McConnell

Howard McConnell
Chairperson, Yurok Tribe

HM/km

The Yurok Tribe

Comments of the 8/05 Pre-Draft Scott River TMDL

The pre-draft Scott TMDL reflects a lot of hard work by the NCRWQCB staff and its consultants. The maps provided are useful, the Guidance for Development of Erosion Control Plans (Appendix C) is exhaustive, and the narrative about conditions and processes affecting sediment and temperature problems is revealing. The recognition of the relationship between flow depletion and water temperature is laudable, as is the recommendation to request that the State Water Resources Control Board Division of Water Rights conduct groundwater studies.

There are still critical flaws in the Scott TMDL approach that are likely to confound success of temperature and sediment pollution abatement and restoring coho salmon or other at-risk Pacific salmon species. Kier Associates (2004, 2005) previous guidance on many elements needed for a successful Scott TMDL have not been integrated, for example:

- Lack of quantification of important land use factors recognized to impact water quality such as timber harvest, road densities, near-stream roads, and road-stream crossings.
- Lack of acknowledgement that peak flows in many watersheds in the Scott basin are higher than natural due to land use activities such as road construction and timber harvest. Increased peak flows cause increased erosion, channel scour, and consequent temperature impacts. Timber harvest increases the risk of rain-on-snow events, which are a factor in peak flows
- Lack of transparency of models and data. All models and data utilized in the Scott TMDL must be available for public inspection. These datasets include all GIS data (including roads, streams, landslides), road surveys, temperature data, and macroinvertebrate data. We request that you send us these datasets so that we can evaluate them.
- Failure to use all available tools to understand and manage watershed risk. Use of the SHALSTAB shallow debris torrent model would allow mapping of erosion hazard areas that could be used to evaluate causal relationships of past activities and as a screen for potential future management consideration.

Other major, fundamental problems with the Scott TMDL include:

- Use of extrapolations without clearly stating the underlying assumptions and attempting to evaluate whether or not assumptions are valid.
- Not targeting essential coho salmon habitat for prioritization for protection and restoration.
- Not recognizing air temperature as the primary factor driving water temperature (Bartholow, 1989), and instead focusing on shade.
- Not fully utilizing remote-sensed vegetation data, including change scene detection, to understand forest health, growth and its relationship to cumulative watershed effects.
- Not utilizing the best available information on groundwater/surface water interactions and specifically not utilizing the 1955 USGS report on this topic.
- The TMDL implementation plan will not lead to attaining temperature and sediment Basin Plan standards or in restoration of beneficial uses. The Implementation Plan is inadequate because:

a. It relies on the Timber Harvest Plan process, a process repeatedly shown to be inadequate in dealing with timber harvest impacts,

b. It does not address implementation actions necessary on public lands administered by the USFS and BLM.

c. It does not include provisions for road maintenance on either public or private lands.

d. It does not address winter logging and especially heavy hauling on native surface and gravel roads.

Chapter 1: Introduction

1.4 Watershed Restoration and Enhancement Efforts: This section of the Scott TMDL as well as others laud the success of Scott River restoration programs, but supply no data other than on French Creek to substantiate benefits to water quality. The Mid-term evaluation of the Klamath River Basin Fisheries Restoration Program (Kier Associates, 1999) is not referenced, although it provides a useful overview of the success of restoration projects through 1998 and changes in habitat during the duration of the program. The Scott TMDL needs to require that all data useful for evaluation of restoration projects be publicly shared and needs to specifically define needed monitoring associated with current and future restoration projects, including organized photo points.

1.5.6 Hydrology: Background discussions of hydrology, as well as all the sections of the Scott TMDL, do not mention the linkage between sediment build up in stream channels on the Scott Valley floor and their impact on stream flow. Channel aggradation in the mainstem Scott and its tributaries leads to diminished surface flow during summer and fall and increases the frequency of channel de-watering.

The Hydrology section has discussions of ground water and its relationship to surface flows that would be improved if the effects of wells were included. (for additional comments on groundwater and wells, see section 4.1.2 below)

Chapter 2: Problem Statement

The Scott TMDL Problem Statement lacks recognition of potential for rain on snow events and increased peak discharge, which is a primary driver of cumulative watershed effects (Jones and Grant, 1996). Channel changes caused by increased peak flows can scour riparian vegetation and cause temperature problems even if sediment yield is low.

2.1.3 Water Quality Objectives: Other TMDLs for northwestern California (U.S. EPA 1998, 1999; 2001) set reference targets for fine sediment, V* and other in channel metrics useful for understanding pollution trends. The Scott TMDL does not currently contain these reference targets. Specific targets should to be adopted and upcoming TMDL monitoring plan should require monitoring of these parameters (see Monitoring section below).

2.2.1.1 Benthic Macroinvertebrate Assemblages: The Scott TMDL references aquatic macroinvertebrate studies by the Siskiyou RCD and recommends use of the Russian River Index of Biotic Integrity (IBI) for comparison. The Russian River IBI is adapted from an urban stream setting and is not appropriate for comparison in the Scott River basin. The RRIBI does not contain control streams; therefore, since the universe of samples only contains watersheds ranging from impaired to highly impaired, they cannot serve as a target or reference. Furthermore, the Russian River has many streams that are highly impacted from urbanization and the two ecosystems are not comparable. Metrics such as the EPT Index, Percent Dominant Taxa Index and Richness are most useful and can be compared to USFS data collected throughout the Western U.S. (Barbour et al., 1999; Barbour and Hill, 2003) that represents both impaired and unimpaired streams. The study design of Herbst and Silldorf (2004) serves an example of how macroinvertebrates can be used to monitor aquatic effects of upland management.

2.2.1.2 Riffle Embeddedness: While riffle embeddedness is one measure of suitability for salmonid spawning, it is more subjective than fine sediment measurements. The USFS survey data acquired by the RWB for the Scott TMDL were not provided with any metadata, so it is not known whether all reaches measured were of the same gradient or if channel confinement varied between sites. Values appear to indicate higher impacts in reaches of streams below heavily managed areas, such as Tomkins and Canyon Creeks, but moderate impacts in watershed areas with lesser management, although the Scott TMDL does not explore that possibility. This would be consistent with cumulative watershed effects as described by de la Fuente and Elder (1998).

2.2.1.3 Large Woody Debris: Because there are no data regarding large wood in streams, discussion of its abundance and distribution do not occur in the Scott TMDL. This is a substantial problem because of the importance to coho salmon of pools formed by large wood (Reeves et al., 1988) and because large woody debris may be linked to downwelling and improved local water temperature conditions (Poole and Berman, 2001). Change scene detection shows extensive timber harvest in riparian zones (see Vegetation section below). Reeves et al. (1993) found that timber harvest reduced large wood supply to streams, which compromised habitat diversity and caused loss of Pacific salmon species diversity. McHenry et al. (1998) described major reduction of large wood in Olympic Peninsula streams and noted that time required for re-growth of trees large enough to assist aquatic habitat complexity could require over 100 years.

Large wood delivery in steep, headwater swales is largely a result of landslides. If areas with high risk of debris sliding are harvested, the rate of failure increases as a result of loss of root strength (Ziemer, 1981), but large wood that would help meter sediment can be greatly reduced (PWA, 1998). The Scott TMDL needs to follow the guidance of Dunne et al. (2000) and use the best available tools, including remote sensing data and models to examine the relationship of timber harvest and large wood recruitment, particularly in reaches that are known to be critical habitat for juvenile coho salmon rearing.

2.2.1.4 Pool Distribution and Depth Conditions: While the Scott TMDL states that "no systematic analysis of pool distribution and depth conditions in the Scott River watershed is currently available", page 4-6 of the TMDL states that the temperature analysis included habitat typing data provided by the Siskiyou RCD and U.S. Fish and Wildlife Service (USFWS). The U.S. Forest Service may also have habitat typing data for streams in the Scott River watershed. Typically, habitat typing data includes data on the distribution and depth of pools. If so, a summary of these data should be presented in section 2.2.1.4, or an explanation provided as to why they was not used.

2.2.1.5 Sediment Substrate Composition: The Scott TMDL should explicitly state targets of less than 14% fines less than 0.85 mm and less than 30% sand and fine gravel (<6.4 mm). The Scott TMDL should avoid making references for upper limits, such as 30% fines < 6.4mm, as fully acceptable since Kondolf (2000) showed that this is a level where 50% mortality of salmonid eggs can be expected. Fine sediment data from Lester (1999) for lower Scott River tributaries should be listed in a table and reaches where study was conducted shown on a map. Also, there appears to be an inconsistency between the citation and references, where Lester (1999) is cited in the text, but it appears in the references twice, as "Lester (1997)" and "Lester (1999)".

Sommarstrom (1991) in cited three times in this section but is not listed in the references section. This is likely either a typographic error (should be Sommarstrom et al., 1990) or an unlisted reference, and should be corrected.

2.2.2 Watershed Sediment Desired Conditions in the Scott River Watershed

This section of the TMDL avoids major topics that must be dealt with if sediment and temperature pollution are to be abated: 1) quantification of road densities and commitment to reducing them, 2) increased flood frequency due to rain-on-snow events and linkage to channel change and thermal pollution, 3) quantification of timber harvest and links to cumulative effects, 4) riparian zone timber harvest impacts on thermal pollution and large wood recruitment, and 5) analysis of forest growth to check assumptions about recovery to background levels for sediment yield and natural hydrologic function.

Road densities are not included in Table 2.8 or in the text of 2.2.2, ignoring potential CWE from roads. Cedarholm et al. (1981) found a direct correlation between road densities and increases in fine sediment in streams harmful to salmonid spawning. USFS (1996) studies in the interior Columbia River basin found that bull trout disappeared at road densities over 1.7 miles per square mile. The Klamath National Forest (Elder et al., 2002) and other northern California forests (Armentrout et al., 1998) have recognized 2.5 miles per square mile of road as a maximum for maintaining properly functioning aquatic conditions. Roads are known to cause higher erosion on unstable rock types in the Scott River basin, such as decomposed granite (DG) (Sommarstrom et al., 1990). Consequently, road density targets for sub-basins with DG should likely have lower targets than 2.5 miles per square mile, but Sommarstrom et al. (1990) found 3.7 miles per square mile already extant in these areas as of 1990.

A major reason that Scott River basin road densities need to be reduced is that they can alter the hydrology of the watershed as described by Jones and Grant (1996). Roads that cut into hillsides often disrupt sub-surface drainage increasing peak flows during storm events and decreasing ground water recharge that supports summer base flows. Without reducing road densities and restoring natural hydrology, natural flow regimes with which salmonids co-evolved cannot be restored. Similarly, increased peak discharge can simplify channels, wash away large woody debris, fill pools and cause bank erosion. The final Scott TMDL needs to have a table of road densities by Calwater Planning Watershed or by designated TMDL study sub-basin.

The extent of timber harvest is also not mentioned in Table 2.8 and only inferred in the item "activities" on unstable lands. This ignores the need to define a prudent limit of risk for timber harvest extent to avoid sediment catastrophic sediment yield from CWE. Ligon et al. (1999) pointed out that the lack of quantification and limit to timber harvest was confounding success in controlling impacts and protecting Pacific salmon (see Disturbed Areas for more discussion).

The intensity of disturbance which a watershed can sustain without being subject to cumulative watershed impacts (including sedimentation and temperature impacts) is, in part, a function of slope/steepness and geology/landform. The Scott River Basin includes large areas which are unstable or potentially unstable. These terrains can not accommodate the same road and timber harvest intensities as more stable terrains without experiencing cumulative watershed effects. We do not see evidence that these differences in landform and associated risk have been incorporated into the TMDL. This should be corrected.

There is no desired future condition of riparian zones called for in Table 2.8, although timber harvest in inner gorge areas is linked to increased mass wasting (de la Fuente and Elder, 1998). In order to protect salmon and beneficial uses, the Scott TMDL needs to require a minimum distance for protection of riparian function. This should be one to two site potential tree heights for such functions as relative humidity (Spence et al., 1996) or to the height of the inner gorge to prevent mass wasting (FEMAT, 1993).

The Scott TMDL states that "agricultural fields or harvest areas in which adequate vegetation......are not considered disturbed areas." Grass fields with no bare soil separated from the river by an adequate buffer in the Scott Valley may appropriately be eliminated from consideration as disturbed; however, the Scott TMDL assumes that older timber harvests have been re-vegetated and are thus no longer contributing to cumulative watershed effects. If forest regeneration is poor on some sites, then susceptibility to rain-on-snow events may remain elevated for an extended period of time (see Disturbed Areas for more discussion).

2.2.2.1 Stream Crossings with Diversion Potential or Significant Failure Potential Conditions in the Scott River Watershed: The Scott TMDL fails to note that some stream crossings in steep areas may cross the paths of debris torrents and that the USFS replaced culverts with cement fords in areas of high risk in the lower Scott River (Kier Associates, 1999). The Klamath National Forest (KNF) 1997 flood study (de la Fuente and Elder, 1998) indicated that channel scour in many tributaries was caused by multiple culvert failures at different locations on the same stream. In a study of Sierra streams, Armantrout et al. (1998) recommended that stream crossings be limited to less than 1.5 per mile of stream. The TMDL should address the issue of stacked culverts and recommend that the USFS method of changing crossing types in high risk locations be carried out on private land as well.

Information should be included in this section from Klamath National Forest data collected as part of the de la Fuente and Elder (1998). The coverage "damage_all" contains information from Emergency Relief Federally Owned (ERFO) Damage Site Reports from the 1997 post-flood field assessments by Forest Engineering. Joining that coverage with its lookup table "all_lut.xls" allows for the viewing of flood damage sites by type. Of the 39 sites identified in the Scott River watershed, 29 were road/stream crossing failures (type "S" in lookup table). It is unknown how many road-stream crossings were surveyed, but the failure rate is likely higher than the TMDL target of 1% of crossings failing in a 100-yr return interval storm, despite the fact that the 1997 storm was only a 14-year return interval storm.

2.2.2.2 Hydrologic Connectivity: The Scott TMDL makes assumptions with regard to road-related projects on timberlands that may not be supported, for example, that roads can be hydrologically disconnected and that impacts from roads can be fully mitigated without reducing road densities. A RWB commissioned study by an independent science review panel on coastal streams (Collison et al., 2003) indicated that similar assertions made by Pacific Lumber Company in their watershed analyses (PL, 2002) were unfounded. Collison et al. (2003) noted that "stormproofing and road upgrading are suggested in the prescriptions to overcome excess sediment production; however, no data have been presented that demonstrates the effectiveness of these programs." Upgrading roads can reduce but not eliminate hydrologic and sediment impacts. Even if roads are well-built and maintained, dense road networks can still cause problems simply due to the number of miles of road. If the Scott TMDL accepts assumptions related to roads and erosion, the Implementation Plan should call for a validation of effectiveness, both with respect to sediment yield and changes in hydrology.

2.2.2.3 Annual Road Inspection and Correction: The KNF has approximately three times more road miles than can be annually inspected and actively maintained (de la Fuente and Elder, 1998).

This suggests that the KNF road network needs to be substantially reduced if road-related erosion is to be controlled. In TMDL implementation (Chapter 5), a requirement should be imposed on the USFS and private timber companies that roads that cannot be annually maintained must be fully decommissioned.

In recent years it has been asserted that roads can be "stormproofed" and that this will obviate the need for maintenance. While "stormproofing" (outsloping, rolling dips, etc.) reduce maintenance needs, reduce the incidence of failure and improve performance, it can not be considered as an alternative to road maintenance. Roads which do not receive needed maintenance will eventually deliver significant amounts of sediment to streamcourses even if they are "stormproofed." Therefore, it is essential that TMDL implementation (Chapter 5) specify maintenance needed to restore beneficial uses.

2.2.2.4 Road Location, Surfacing, Sidecast: The Scott TMDL sets a target for road location as follows: "decrease road length next to streams and increase proportion of out-sloped or hard surfaced roads." This section notes that the SHN Consulting Engineers and Geologists (1999) survey did not quantify the number of roads adjacent to streams; however, a capable GIS analyst could easily conduct this analysis for the entire Scott River basin from existing data. As stated above, the RWB has the capability to perform this analysis, and should do so, and present the results in the TMDL as tables and charts. As with the road density charts proposed above, we recommend making one chart per sub-basin, with the charts showing data for each individual Calwater Planning Watershed in that sub-basin. See Graham Matthews and Associates (2001) table 38 (page 128) for an example of table similar, though more complex, than the table we are recommending here. It is important to quantify the location of roads because it will shed light on current conditions, and hence on how much change is necessary to meet the TMDL objectives. As roads are improved in the coming years, the analysis can be redone to see how much progress has been made.

2.2.2.5 Activity in Unstable Areas: The Scott TMDL recognizes that tools like the shallow landslide stability (SHALSTAB) model have been used to successfully predict "chronic risk areas including steep slopes, inner gorges, and headwall swales" (Dietrich et al., 1998) and also noted the increased failure risk associated with inner gorge locations (Graham Matthews and Associates, 2001). Unfortunately, the TMDL states that "analysis of activities in unstable areas was not conducted for this report." The Scott TMDL should be using the SHALSTAB model to map high risk areas, identify the linkage these areas, management disturbance and resulting sediment yield. The SHALSTAB model could be run in an automated way for the entire basin with existing 10 meter digital elevation model (DEM) data. If actions are planned in those identified areas, then an on-the-ground survey by a geologist could provide field-based information to supplement the SHALSTAB model. These maps should be included in section 2.2.2.5 TMDL, and also be available electronically in GIS format.

On page 2-13, it is mentioned that road density for the SHN Consulting Engineers and Geologists (1999) study area was 8.9 miles of road per square mile. It would be highly useful to include charts or tables of road densities in the Scott River basin. In the sediment source analysis for the mainstem Trinity River (Graham Matthews and Associates, 2001), table 37 (page 127) were presented showing road lengths, drainage area, and road densities. For an example of a chart made from Graham Matthews and Associates (2001) data see:
http://www.krisweb.com/krisklamthtrinity/krisdb/webbuilder/nt_c17.htm
There are 68 Calwater Planning Watersheds in the Scott River basin; one chart should be made for each of the sub-basins where there are high road densities associated with land management. These

charts and tables could be easily made from existing data by a capable GIS analyst, of which the RWB has several.

2.2.2.6 Disturbed Area: While the TMDL is correct in stating that the there is not yet at this time information or analysis "sufficient to identify a threshold below which effects on the Scott River watershed would be insignificant", it would still be valuable to use existing data to calculate disturbed areas. Timber harvest data are available for all periods from the Klamath National Forest, but only between 1992 and 2002 on private land from CDF. Similar to the road density and road location maps requested above, we recommend that the RWB include TMDL tables and charts of the percentage of each Calwater Planning Watershed that has been timber harvested over the period of available data, and include them in section 2.2.2.6.

Reeves et al. (1993) showed that Pacific salmon species diversity was compromised when timber harvest exceeded 25% of a watershed in Oregon coastal basins. Ligon et al. (1999) pointed out that the lack of quantification and limit to timber harvest was confounding success in controlling impacts and protecting Pacific salmon. Sommarstrom et al. (1990) indicated that "39% of the granitic area has been harvested, not including site re-entries, based on data from 1958-1988 for public lands and 1974-present for private lands." Decomposed granitic soils are notoriously xeric after timber harvest and regeneration of forests can be slow (TCRCD, 1998). Consequently, timber harvests not mapped by the RWB and its staff that occurred between the late 1970's and 1992 may still be contributing to cumulative watershed effects, including sediment yield.

While vegetation data derived from Landsat was used in Scott TMDL temperature modeling, those data were not used to gauge active timber harvest in riparian zones. The RWB staff should be using remote sensing data for reconnaissance and analysis, such as change scene detection, to understand patterns of landscape disturbance and forest growth and build that knowledge into the TMDL. Change scene detection is a series of Landsat scenes from different periods are compared to study the pattern in landscape change for a given period (Levien et al., 2002). Data for the Scott River basin are available from the California Department of Forestry (CDF) in a project carried out jointly with the U.S. Forest Service Spatial Analysis Lab in Sacramento for the period 1994-1998, which brackets the January 1997 storm. Areas with highest rates of recent disturbance have the greatest risk of CWE should be studied as a priority and mentioned as a concern.

The northeastern and northwestern parts of the Scott Valley (West Canyon and East Canyon sub-basins) watersheds had the highest change in vegetation owing to high rates of timber harvest on both private and USFS lands. Patterns of disturbance include sensitive headwaters areas, inner gorge locations, and riparian areas.

The West Canyon (northwestern) is largely owned and managed by the U.S. Forest Service, but timber harvest activity is widespread. While canopy reduction shows areas recently harvested, it also outlines debris torrents and channel scour as linear patterns bordering Tomkins Gulch and lower Middle and Kelsey Creeks de la Fuente and Elder (1998). The channel resetting debris torrents caused by the January 1997 storm were a very high level of impact for a 14-35 year return interval event (de la Fuente and Elder, 1998). Patterns of disturbance indicated that roads, clear cuts, and previous fires tended to elevate contributions of sediment. Green polygons displayed in change scene data indicate growth in areas that were logged previously or disturbed by fire in the 1980's.

Change scene detection data using 1994 and 1998 Landsat images (Levien et al, 2002) shows active timber harvest in riparian zones in recent years. Desired future watershed conditions should include riparian zones that approach the natural range of variability in size and height so that thermal buffering and large wood recruitment potential can be protected and improved.

Although the TMDL did not identify impacts from landslides and sediment to the East Fork Scott River sub-basin, the East Fork experienced channel scour and flood damage as a result of the January 1997 storm event (Kier Associates, 1999). Timber harvest was high during the period of 1994-1998 on public and private land in some areas that are likely subject to rain-on-snow events in this sub-basin (Figure 6). Patterns of disturbance in transient snow zone and linkage to increased peak flow and channel scour of the East Fork need to be explored. Lack of tree growth in areas previously harvested may cause a window of extended risk for rain-on-snow events (Figure 7). Patterns of road failures from de la Fuente and Elder (1998) are similar to other areas in the transient snow zone.

Berris and Harr (1987) and Coffin and Harr (1991) found that old forests trap snow in the canopy that can than return directly to the atmosphere as a result of ablation. Snow fall in a heavily managed or clear cut forest tends to build up in a snow pack that is less subject to ablation; consequently, peak flows in the transient snow zone may be elevated over normal by rain-on-snow events. Figures 8 shows Klamath National Forest timber harvests by decade in the Kangaroo Creek and Big Carmen Calwater Planning Watersheds, followed by remote sensing vegetation data in the same area. Comparing the two maps shows that there is little or no re-growth after timber harvest in the 1980s with polygons of previously logged areas showing up clearly as Non-Forest or Saplings. This indicates problems with forest regeneration and such stunting would lead to increased and continuing risk of damaging flows due to rain-on-snow events.

A map of the transient snow zone needs to be added to the Scott TMDL as well as a discussion of increased peak flow, channel scour and resulting increased water temperature. The TMDL Implementation should call for reduced road densities and timber harvest in the transient snow.

2.7.1 Summary of Temperature Conditions

The charts of stream temperature presented in this section span mostly back to only 1996 (with some mainstem Scott data back to 1995). KRIS contains USFS data from 1994 and 1995 for the mainstem Scott and tributaries in the West Canyon sub-basin. These data are important because they date before the January 1, 1997 flood, when many streams in the Scott basin torrented, widening channels and removing riparian vegetation. Comparing these data with 1997-2004 data would show if temperatures increased as a result of the 1997 flood. These data should be incorporated into the West Canyon and mainstem charts in this section of the TMDL. The data are available online, with a list of charts located at:
http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/selecttopic_scott_river.htm
The source table for the 1994 USFS data is located at:
http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sc_cst5.htm
The source table for the 1995 USFS data is located at:
http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sc_cst8.htm

2.7.2 Temperature-Related Desired Conditions
2.7.2.1 Effective Shade: The Scott TMDL states that "target shade conditions are those that result from achieving the natural mature vegetation conditions that occur along stream channels in the watershed." The TMDL then fails to note that timber harvests have been active in riparian zones, despite availability of USFS and CDF 1991-2002 timber harvest data. Figure 11 shows upper Etna Creek in the Mill Creek Calwater Planning Watershed with timber harvest scheduled specifically for riparian areas. USFS and CDF change scene detection data (Lavien et al., 2002) contrasting 1994 and 1998 Landsat scenes are available for the Scott River and also reveal changes in riparian areas.

Figure 12 shows the riparian zone of lower French Creek where there was substantial canopy decrease. Although the resolution of this remote sensing imagery is a 30-meter pixel, this pattern of disturbance certainly would affect the near-stream microclimate.

2.7.7.2 Thermal Refugia: The Scott TMDL has a stated goal of "increased volume of thermally stratified pools." While this is a laudable objective, pools are unlikely to become deeper and tend toward their natural range of variability of volume and depth if the landscape is not closer to its normal hydrologic range of variability due to early seral stage conditions and high road densities. Similarly, channels will tend to have reduced pool frequency below high risk landslide zones that are disturbed by timber harvest or road building. There may be a time lag from time of timber harvest and the time that landslides are initiated 8-30 years later due to root strength failure (Ziemer, 1981). As discussed above, refugia need to be identified and protected in the Scott TMDL and Scott River TMDL Implementation should follow Bradbury et al. (1995) in protecting these areas as a priority and focusing restoration in restorable areas adjacent.

This section of the TMDL does not mention that aside from thermally stratified pools, the confluences of smaller tributaries with the mainstem Scott River are also important coldwater refugia. These areas are particularly important in the Scott River canyon. Information on the importance of creek mouths as coldwater refugia should be added to this section of the TMDL.

Chapter 3: Sediment

3.2 Road Related Sediment Delivery
3.2.1 Two Estimates Made:
"Because this type of road inventory was not available in other subwatersheds, the rates estimated in the South Fork were extrapolated to the rest of the mountainous subbasins in the Scott River watershed."

This extrapolation from the South Fork to the entire Scott basin requires some assumptions. These assumptions should be clearly stated in the TMDL so it can be determined if they are valid. The basic assumptions is that the amount of sediment produced per mile of road in geologic types in the South Fork Scott is the same as the amount of sediment produced per mile in the those same geologic types across the Scott River basin. It is our understanding that for this assumption to be correct requires the following to be the same between the South Fork Scott watershed and the Scott River basin:
- Distribution of road surface types (paved, gravel, dirt, etc.) is similar
- Distribution of travel intensities on the roads are similar
- Precipitation and storm intensity are similar
- Distribution of vegetative cover alongside roads is similar

The TMDL should also state what percentage of the entire Scott basin is contained in the area of the South Fork surveyed by Resource Management in 2000. Page 3-7 states that the survey covered "all timber company roads in the South Fork sub-basin" Examination of a GIS map showing land ownership and sub-basin boundaries indicates that only approximately one-third of the South Fork sub-basin (also known as West Headwater) is privately owned. Table 3.2 of the TMDL states that the West Headwater sub-basin contains 5.4% of the total area in the Scott basin. It appears then that the road erosion component of the TMDL is extrapolated from only about 2% of the entire Scott basin. This number should be calculated more precisely and included in the TMDL in section 3.2.1.

The South Fork Scott is one of the less disturbed sub-watersheds in the Basin. This suggests that utilizing it to estimate road related sediment delivery could result in a substantial underestimate of road related sediment impacts.

3.2.2 Discrete Sediment Sources (Road Inventory and field-check):
This section notes that the South Fork data showed a 50% underestimation of road-stream crossings, so the number of road-stream crossings in each of the rest of the sub-basins was doubled. If possible, some attempt should be made to determine if that is a valid assumption. Page 2-13 states that "The USFS has done a large scale survey of road-stream crossings in the Klamath National Forest, but the survey does not directly address the extent of hydrologic conductivity." These data provide a means to check the accuracy of the 50% assumption. The RWD should determine the extent of the Scott River basin that has been surveyed by the USFS and compare the number of road/stream crossings identified in the USFS surveys in that area with the number of roads/stream crossings identified in that area from the GIS data.

This section also states that:

> "In the RM South Fork road survey, the largest contributing features were all located within a single quarter-mile-long section of failing road. These few features accounted for 75 percent of the total contribution from road failures. Thus, these features are anomalous in context. For that reason they were not included in the group that was used to calculate the rates used to extrapolate to the South Fork watershed but instead were combined and treated separately as a single discrete feature added to the South Fork Subwatershed sediment summary." (p 3-8)

While the RWB staff likely made the most correct decision possible under the circumstances, this fact points out the uncertainty in extrapolating from one sub-basin to the entire basin. Given that only approximately 2% of Scott basin was surveyed, and these large features were found, there are almost certainly "anomalous" major features in other areas of the Scott basin. By not including those "anomalous" features, the RWB has likely skewed its estimate of road-related sediment production low.

3.8.2 Streamside Mass Wasting and Erosion Features - Stratified Random Sampling:
This section of the TMDL should state what percentage of the total stream miles in the Scott basin were surveyed in the stratified random sampling. Any embedded assumptions should also be stated. For instance, this analysis assumes does not take into account differences in disturbance regimes between watersheds.

Chapter 4: Temperature

4.1.1 Temperature Sources: Stream Heating Processes: Scott TMDL discussions of temperature pollution do not reflect a current "best science" understanding of riparian conditions, air flow over the stream and their relationship to water temperature. The final document needs to reference Bartholow (1989), Essig (1998) and Poole and Berman (2001). Bartholow (1989) demonstrated that air temperature over the stream is by far the most significant driver of maximum water temperature. Poole and Berman (2001) describe the relationship between riparian conditions and microclimate over the stream, which can have a major influence on water temperature in smaller upland tributaries. For example, forest harvest back from the area where direct shade is provided to the stream may open air flow and allow more heat exchange with the water. This presents a potential problem in the Scott River basin Westside tributaries, where such shifts that could eliminate coho habitat without changing the shade. The TMDL for temperature in Idaho (Essig, 1998) recognized the water temperature air temperature relationship presented by Bartholow (1989). The Scott TMDL model runs mention that microclimatic effects were considered, but the description of model parameters and assumptions is lacking.

Science associated with the Northwest Forest Plan (FEMAT, 1993) indicates that the zone of riparian influence is two site potential tree heights or more. Water temperature buffering, in the form of cool air temperatures and high humidity over the stream, rapidly deteriorates under one site potential tree height protection (Chen, 1991). As mentioned in discussion of section 2.7.2.1, timber harvest has been active in riparian zones in the Scott River basin, which is decreasing desired conditions for optimum temperature buffer potential. The Scott TMDL states that the timber harvest permit process under CDF's jurisdiction will prevent future riparian damage despite previous studies (Ligon et al., 1999) and experience in the Scott River basin show that that process has not worked previously in this regard. The discussion in the Scott TMDL of modeling of riparian shade included the following: "Our analysis of factors affecting stream temperatures has determined that reductions of stream shade cause increases in stream temperature. Therefore, the California Forest Practice Rules do not ensure that water quality objectives set in the Basin Plan will be met." (p. 4-29)

Page 4-32 states that, "The load allocations for this TMDL are the shade provided by topography and natural mature vegetation conditions that occur at a site, approximated as adjusted potential shade conditions." This statement from the Scott TMDL infers that where topographic exists, retention of trees for shade might be decreased during timber harvests. This ignores the effects of riparian timber harvest on large wood recruitment and the implications for aquatic habitat.

<u>4.1.2 Stream Heating Processes Affected by Human Activities in the Scott River Watershed:</u>

The Groundwater section of the Scott TMDL on page 4-4 to 4-5 states:

> "The only readily available data that provide a glimpse of recent groundwater conditions are water table measurements at five wells in Scott Valley. Analysis of these data shows that in general drawdown is greater in dry years. The water table measurements for one of the wells are presented in Figure 4.1."

Comments submitted by the Quartz Valley Indian Community (2005) to the Scott River Watershed Council contain a map and graphs for each of the five Scott Valley monitoring wells (included as Appendix A). The graphs show the annual minimum and maximum measurements at a well, along with annual precipitation at the Fort Jones rain gage. The RWB should consider including these graphs and map in the TMDL. The charts suggest that while annual maximum levels have remained relatively constant over time (fluctuating with precipitation), annual minimum levels have declined since 1965 (though they fluctuate with precipitation).

<u>4.3.1.7 Results Combined Scenarios</u>: This section discusses the results of modeling scenarios that combined changes to individual factors (shade, groundwater accretion, surface diversions, and channel geometry) to see the effects on temperature. For some reason, no numbers or figures are presented in this section. Graphs should be added to show the results of these combined scenarios.

<u>4.7 Recommendations for Additional Study and Future Action:</u> The Scott TMDL (p 4-34) recommends supporting "riparian grazing workshops that educate range managers on the latest

techniques for managing riparian areas in rangelands." Holding riparian grazing workshops is a good idea, but this should be phrased differently, with an accompanying alteration of philosophy. The phrasing implies a top-down approach in which outside experts are going to come in and "educate" the locals about the best way to manage their land. The citizens of Siskiyou County may not respond well to that approach. We recommend the following language instead "Support riparian grazing workshops where local range managers and other experts can exchange information on the latest techniques for managing riparian areas in rangelands."

Chapter 5: Implementation

The RWB has an obligation to make sure that the water quality objectives are met, and beneficial uses restored and protected. If there are multiple ways to meet the objectives, we support giving landowners the flexibility to decide how they want to meet those objectives. For example, if other regulatory and policy processes such as the Scott Incidental Take Permit, Coho Recovery Plan, and Timber Harvest Plans will result in the obtainment of water quality objectives, then further regulation by the RWB is not necessary. Duplicative and overlapping regulation benefits no one. Often, however, these other policy processes do not have sufficient attention to water quality, and will not result in achievement of TMDL objectives. <u>When other policy processes and voluntary landowner actions will not result in achievement of TMDL objectives, then the RWB must use its considerable regulatory and enforcement authority to take necessary actions to ensure results.</u>

Chapter five is lacking a discussion of how restoration priorities should be set. We recommend following the approach of Bradbury et al. (1995), which is to identify the most intact habitat patches and beginning restoration by making sure that these areas are protected and enhanced as a top priority. In the Scott River basin, these would be the stream reaches with coho salmon. Protecting coldwater refugia within the mainstem should also be a priority.

<u>5.1.6.2 Water Use and Water Rights Implementation Actions for the State Water Board:</u> Figure 4.10 indicates that water temperatures in the mainstem Scott are highly influenced by groundwater accretion. Based on Figure 4.10 and other modeling results presented in the Scott TMDL, it is evident that coldwater fisheries beneficial uses may not be able to be protected without addressing the issues of water rights and water use. For that reason, we strongly support the RWB in recommending that the SWRCB study the interactions between water use, groundwater, and surface water. We also support the recommendation that the State Water Board and its Division of Water Rights "take the findings of the research into consideration and act accordingly to protect and restore the instream beneficial uses of the Scott River and its tributaries, with particular focus on those beneficial uses associated with the cold water fishery." (p. 5-14)

While further studies by the SWRCB are desirable, there already exists information on ground and surface water interactions in the Scott Basin. That information is contained in the 1955 study of groundwater in the Scott Valley published by USGS. This study found substantial interconnection of surface and ground water in the valley bottoms (mainstem and lower reaches of valley tributaries). This information needs to be referenced and utilized to identify actions needed to address the interaction of ground and surface water. During the past 30 years there has been a substantial increase in ground water pumping in the Scott Valley (see DWR well database). The USGS Report and expert opinion universally is that this ongoing appropriation is interconnected groundwater. The decline in dry season river flows (USGS gauge) by decade when corrected for precipitation variance also give empirical indication that groundwater pumping is significantly reducing surface flow and thus negatively impacting temperature conditions. An analysis of flow data at the USGS gauge - normalized for annual precipitation differences – should be conducted and included in the

TMDL. This analysis will demonstrate the impact on surface flows of increase interconnected groundwater pumping. If we are going to prevent extirpation of Coho and restore beneficial uses, we can't afford to wait for more studies. The groundwater issue must be dealt with or this TMDL will not be effective in restoring water quality and beneficial uses.

5.1.1 Road and Sediment Waste Discharge Implementation Actions for Individual Responsible Parties: Scott TMDL should set quantitative limits on allowable road densities in each watershed (see comments in section 2.2.2, 2.2.2.2, and 2.2.2.4 above). If the RWB does not have adequate information on which to base such a limit, studies should be conducted to determine what an appropriate value would be. Also, a requirement should be imposed on the USFS and private timber companies that roads that cannot be annually maintained must be storm proofed or fully decommissioned (see comments on section 2.2.2.3 above).

5.1.8 Timber Implementation Actions for Private and Public Responsible Parties: The Scott TMDL should set quantitative limits on the percentage of a watershed that can be harvested in a given time frame. If the RWB does not have adequate information on which to base such a limit, studies should be conducted to determine what an appropriate value would be. For more information on this subject, see comments on section 2.2.2.6 above.

5.1.9 Implementation Actions for the United States Forest Service
As recommended in section 5.1.8 above, The Scott TMDL should set quantitative limits on the percentage of a watershed that can be harvested in a given time frame. Also, allowable road densities should be set as recommended in section 5.1.1 above.

Table 4 which specifies implementation action does not address implementation by the US Forest Service or Bureau of Land Management. Because a large portion of the basin is in federal ownership failure to specify implementation actions needed on federal land will preclude the TMDL's effectiveness in restoring beneficial uses. We strongly recommend that the final TMDL implementation plan include actions necessary on federal land to address sediment and temperature standard non-attainment. Specifically, we recommend that MOUs with the USFS and BLM commit the USFS and BLM to implementing the Aquatic Conservation Strategy of the Northwest Forest Plan. These MOUs should be completed prior to adoption of the implementation plan. The TMDL consent decree has time-lines for adoption of TMDLs but not implementation plans. Therefore, implementation adoption can and should be deferred until these essential MOUs are in place.

This type of MOU is part of the Salmon River temperature TMDL. There is no good reason to not follow the same approach here.

Should the federal entities decline to enter into these MOUs an approach similar to that taken with Siskiyou County should be adopted. Specifically, Waste Discharge Requirements should be imposed on all federal logging, road construction and road reconstruction unless the federal entities (USFS and BLM) adopt the MOU committing them to implement the Aquatic Conservation Strategy at least until recovery of beneficial uses and attainment of water quality standards is achieved.

Table 4 – Implementation Actions – is also silent on the issue of road maintenance. However, it is a fact of life that roads which are not adequately maintained will chronically deliver sediment and will eventually fail (usually in a major storm event). No amount of "stormproofing" can obviate the need for appropriate maintenance and no TMDL in this basin can be effective if it does not address the need for appropriate road maintenance – particularly on native surface and logging roads. We recommend that the Implementation Plan require annual post wet season and post major storm

inspection of all native surface and gravel roads and that all problems identified through such inspections be repaired in a timely manner. Road maintenance requirements should be applied at minimum to all public and private native surface and gravel roads.

Table 4 – Implementation Actions – is also silent on the issue of heavy winter hauling (logs, etc.) and winter logging. This omission needs to be corrected. Empirical studies (see Leslie Reed and others) clearly indicate that winter log hauling on native surface and gravel roads results in significant sediment delivery to streamcourses. Failure to address winter heavy hauling on such roads will prevent restoration of beneficial uses and attainment of water quality standards for sediment.

Chapter 6: Monitoring

The TMDL monitoring plan that will be developed by the RWB should specifically state that all data used for monitoring and assessment under the TMDL Implementation should required to be released as raw data. Access to data is essential an essential part of a transparent scientific process. The monitoring plan should also specify that all data collected as part of TMDL monitoring should be added to an easily accessible electronic database. One such existing database is KRIS, the Klamath Resource Information System (see www.krisweb.com)